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Decimal Coinage Commissioners

1857 [2212. Sess. 2] XIX.

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PRELIMINARY REPORT

OF THE

DECIMAL COINAGE COMMISSIONERS

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
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LETTERS PATENT.

Victoria, by the Grace of God of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith. To Our right trusty and well beloved Councillor Thomas Spring Lord Monteagle of Brandon, Our right trusty and well beloved Samuel Jones Lord Overstone, and Our trusty and well beloved John Gellibrand Hubbard, Esquire, greeting. Whereas We have deemed it advisable for divers good causes and considerations that a Commission should forthwith issue to enquire into the expediency of introducing the principle of Decimal Division into the Coinage of Our United Kingdom: Now know ye, that We, reposing especial trust and confidence in your approved wisdom and fidelity, have assigned, nominated, and appointed, and by these Presents do assign, nominate, and appoint you, the said Thomas Spring Lord Monteagle of Brandon, Samuel Jones Lord Overstone, and John Gellibrand Hubbard to be Our Commissioners for considering how far it may be practicable and advisable to introduce the principle of Decimal Division into the Coinage of Our United Kingdom. And We do by these Presents give and grant unto you Our said Commissioners, or any two of you, full power and authority to enquire of and concerning the premises by all lawful ways and means whatsoever, and to call before you or any two of you such persons as you shall judge necessary by whom you may be the better informed of the truth in the premises. And We do also give and grant unto you, or any two of you, full power and authority, when the same shall appear to be requisite, to administer an oath or oaths to any person or persons whatsoever to be examined before you, or any two of you. And We do by these Presents require and command you, Our said Commissioners, or any two of you, to report to Us in writing under your hands and seals all and every your proceedings by force of these Presents, and your opinions touching and concerning the premises. And We do by these Presents declare and ordain that this Our Commission shall continue in full force and virtue, and that you Our said Commissioners, or any two of you, shall and may from time to time proceed in the execution thereof, although the same be not continued from time to time by adjournment. And We do by these Presents require and command all and singular Our officers and ministers, and all other Our subjects whatsoever, to the aiding and assisting to you and each of you in the execution of this Our Commission. And for your further assistance in the execution of these Presents We do hereby authorize and empower you to appoint a Secretary to this Our Commission, whose services and assistance We require you to use from time to time as occasion may require. In witness whereof We have caused these Our Letters to be made Patent. Witness Ourself at Westminster, the first day of November, in the nineteenth year of Our reign.

By Warrant under the Queen's Sign Manual.

C. ROMILLY.

PRELIMINARY REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, Your Majesty's Commissioners for considering how far it may be practicable and advisable to introduce the principle of Decimal Division into the Coinage of the United Kingdom, humbly offer to Your Majesty this our First and Preliminary Report:—

Before entering upon the different heads of the inquiry, it was important to consider and define the precise subject referred to us by Your Majesty, and as a preliminary matter to trace the progress of the question of Decimal Coinage, and to ascertain the position in which it had been left at the time of the issuing of the Commission.

The question of a Decimal scale, though only as regards weights and measures, came under the consideration of a Royal Commission, appointed in the year 1816, "to consider how far it might be practicable or advisable to "establish a more uniform system of weights and measures." The Commissioners were, Sir Joseph Banks, President of the Royal Society, Sir George Clerk, Mr. Davies Gilbert, Dr. Wollaston, Dr. Thomas Young, and Captain Kater. Their first report, presented in 1819, contained the following recommendation:—

"The subdivision of weights and measures at present employed in this country appears "to be far more convenient for practical purposes than the Decimal scale, which might "perhaps be preferred by some persons for making calculations with quantities already "determined. But the power of expressing a third, a fourth, and a sixth of a foot in "inches, without a fraction, is a peculiar advantage in the duodecimal scale; and for "the operations of weighing and of measuring capacities the continual division by "two renders it practicable to make up any given quantity with the smallest possible "number of standard weights or measures, and it is far preferable in this respect to "any Decimal scale. We would therefore recommend, that all the multiples and sub-"divisions of the standard to be adopted should retain the same relative proportions "to each other as are at present in general use."

In 1824 the late Sir John Wrottesley, afterwards Lord Wrottesley, brought before the House of Commons a motion for inquiring into the applicability of the Decimal scale to coins. The mover stated that he had no intention of proposing any change in our gold or silver coins. He referred to the example of France, of the United States, and of China, and described the change he advocated as the substitution of a simple for a complex system of account. The coins recommended by Sir John Wrottesley were pounds, double shillings, and farthings, the last having 4 per cent. deducted from their present value, making 100 farthings=1 double shilling, and 1,000 farthings=10 double shillings=1 pound.

The Master of the Mint, Mr. Wallace, afterwards Lord Wallace, on the part of the Government, opposed the motion on the ground of the inconvenience which might attend its adoption. He stated, however, that he did not deny the advantages of the plan. The motion was withdrawn, a pledge being given (which was carried into effect by the 6 Geo. IV., c. 79.), that the currencies of Great Britain and Ireland should be assimilated.

In consequence of the destruction of the standards of weight and measure in the fire which destroyed the Houses of Parliament, Commissioners were appointed in May 1838, to whom the question of the restoration of the standards was referred by Lord Monteagle, then Chancellor of the Exchequer. These Commissioners were, G. B. Airy, Astronomer Royal, Francis Baily, President of the Royal Society, J. E. Drinkwater Bethune, Sir J. F. W. Herschel, Bart., Sir J. G. Shaw Lefevre, Sir J. W. Lubbock, Bart., the Very Rev. George Peacock, Dean of Ely, Lowndean Professor of Astronomy, and the Rev. R. Sheepshanks.

These Commissioners made a report on the 21st December 1841, containing the following statement :—

"The first point which has called for our special notice is, the general question of "Decimal scale. In introducing this subject we beg leave to invite the attention of "the Government to the advantage and the facility of establishing in this country a "Decimal System of Coinage. In our opinion no single change which it is in the power "of a Government to effect in our monetary system would be felt by all classes as equally "beneficial with this, when the temporary inconveniences attending the change had "passed away. The facility consists in the ease of interposing between the sovereign "(or pound) and the shilling a new coin equivalent to two shillings (to be called by "a distinctive name); of considering the farthing (which now passes as the $\frac{1}{960}$th part "of the pound) as the $\frac{1}{1000}$th part of that unit; of establishing a coin of value equal "to $\frac{1}{100}$th part of the pound; and of circulating, besides these principal members of "a Decimal Coinage, other coins of values bearing a simple relation to them, including "coins of the same value as the present shilling and sixpence. We do not feel ourselves "at liberty further to enter into this subject, but we have felt it imperative on us to "advert to it, because no circumstance whatever would contribute so much to the intro-"duction of Decimal scale in weights and measures in those respects in which it is really "useful as the establishment of a Decimal Coinage."

In the year 1843 a second Commission was appointed for the same purposes as those which had been contemplated in the appointment of the Commission of 1841. It included the names of the Astronomer Royal, Sir J. F. W. Herschel, Sir J. G. S. Lefevre, Sir J. W. Lubbock, the Dean of Ely, and Mr. Sheepshanks, members of the former Commission, with whom were associated the late Marquis of Northampton, President of the Royal Society, the Earl of Rosse, Lord Wrottesley, and Professor Miller. The report of this Commission referred to and proposed to carry out the recommendations which we have quoted of the report of 1841.

On the 27th of April 1847 the question was brought before Parliament by a motion made in the House of Commons by Sir John Bowring, for an Address to the Crown in favour of the coinage and issue of silver pieces of the value of $\frac{1}{10}$th and $\frac{1}{100}$th of the pound sterling, avowedly as a step to the complete introduction of a Decimal division of the pound.

The Chancellor of the Exchequer, Sir Charles Wood, stated that the first step in the adoption of such a system was to establish a coin $\frac{1}{10}$th of a pound sterling. To strike a two-shilling piece he had no objection.

The motion was withdrawn on the understanding that a silver piece of the value of $\frac{1}{10}$th of the pound sterling should be coined and issued. This engagement was afterwards carried into effect by the issue of the florin.

On the 26th of March 1853 the Commissioners who had been appointed in 1843 addressed a letter to Mr. Gladstone, then Chancellor of the Exchequer, in which they stated, that "they it felt their duty to represent that they "were strongly impressed with the advantages of a Decimal System of Coinage, "and that having learnt that an immediate coinage of copper to a considerable "amount was in contemplation, they made an urgent request, that, before "specific steps were taken in reference to the proposed coinage, the Decimal "System might be carefully considered, trusting that the result would be that "the Government would decide on issuing coins related to the millesimal "subdivision of the pound." They suggested "that coins of the value $\frac{1}{1000}$th, "$\frac{2}{1000}$th, and $\frac{4}{1000}$th of a pound (differing little from the farthing, the half-"penny, and the penny) might be extensively used by the public without "present inconvenience, while the inscription of their values, as estimated in "the Decimal scale, would afford the means of shortly introducing that scale "throughout the entire system." This letter was signed by the Astronomer Royal, the Earl of Rosse, then President of the Royal Society, Lord Wrottesley, now President of the Royal Society, the Dean of Ely, Sir J. W. Lubbock, Sir J. G. S. Lefevre, the Rev. R. Sheepshanks, and Professor Miller.

On the 5th of April 1853, in answer to an inquiry made in the House of Commons, whether it was the intention of Government to carry out the system of Decimal Coinage, and whether it was intended to issue the new copper coinage on a Decimal basis, Mr. Gladstone, then Chancellor of the Exchequer, stated "that there was no intention on the part of the Government to make "any change with respect to the copper coinage. With respect to the general "question of a Decimal Coinage the Government were fully sensible of the

" great importance of it, and they likewise felt that the utmost attention was " due to the arguments and opinions of those who had recommended the " change; but the Government were also of opinion that the matter was one " of great importance, and of great delicacy as well as importance, and that the " altering of the value of those particular coins, which are in point of fact " the measures of value and the basis of the whole idea of value of the mass " of the people, was a very serious matter indeed, and one which ought not to " be undertaken on any mere abstract opinions and considerations without fully " ascertaining that the ground under foot was secure. The course which " would be taken by the Government was this:—An Honourable Member had " lately given notice of a motion for the appointment of a Select Committee " to inquire into the subject, and the motion would receive the support of " Government, for it would lead to such an elucidation of the matter as would " enable the Government and the House to form a conclusive judgment on " the subject."

Accordingly, on the 12th of April 1853, on the motion of Mr. W. Brown, M.P. for South Lancashire, and with the concurrence of the Government, a Select Committee was appointed to take into consideration and report to the House the practicability and advantages or otherwise that would arise from adopting a Decimal System of Coinage.

It appears that the entire subject of decimalizing moneys, weights, and measures, had been at first included in the notice of motion for the Committee, but that the question of weights and measures had been withdrawn from the notice at the suggestion of Mr. Gladstone, who was of opinion that it would be more advisable for the present to fix attention upon the single object of coins and accounts.

The witnesses examined by the Committee, twenty-five in number, were all in favour of the introduction of a Decimal Coinage, and all, except T. E. Headlam, Esq., M.P. for Newcastle, in favour of the particular scheme which had been recommended by the Commissions of 1841 and 1843, and which is known as the Pound and Mil Scheme.

The Committee reported to the House of Commons on the 1st of August 1853.

The recommendations of the Committee were in substance identical with the propositions made in the House of Commons in 1824 and 1827, and with the recommendations of the Commissioners of 1838 and 1843.

The report stated, that " with regard to the inconveniences of the existing " system the evidence was clear and decided. That system was shown to entail " a vast amount of unnecessary labour, and great liability to error, to render " accounts needlessly complicated, to confuse questions of foreign exchanges, " and to be otherwise inconvenient. On the other hand, the concurrent " testimony of the various witnesses was to the effect that the adoption of a " Decimal System would lead to greater accuracy, would simplify accounts, " would greatly diminish the labour of calculations (to the extent of one half, " and in some cases four fifths, according to Professor De Morgan, who had " made the question his especial study), and, by facilitating the comparison " between the coinage of this country and other countries that have adopted the " Decimal System, would tend to the convenience of all those who are engaged " in exchange operations, of travellers, and others. An important benefit would " be derived in several departments of the public service, and in every " branch of industry, from the economy of skilled labour which would result " from the proposed change; at the same time that the education of the " people generally would be much facilitated by the introduction into our " schools of a system so directly calculated to render easy the acquirement of " arithmetic."

The Committee recommended the pound sterling as the unit of the new system of coinage. " Considering that the pound is the present standard, " and therefore associated with all our ideas of money value, and that it is " the basis on which all our exchange operations with the whole world rest, " any alteration of it would lead to infinite complication and embarassment " in our commercial dealings; in addition to which its retention would afford " the means of introducing the Decimal system with the minimum of change."

The Committee recommended the withdrawal of the half-crown, the 3*d.* and 4*d.* pieces, and the introduction of copper coins of one, two, and five mils, and silver coins of ten and twenty mils.

The Committee summed up their recommendations in the following words :—

"In conclusion, your Committee, having well weighed the comparative merits of the "existing system of coinage and the Decimal System, and the obstacles which must "necessarily be met with in passing from the one to the other, desire to repeat their "decided opinion of the superior advantages of the Decimal System, and to record "their conviction that the obstacles referred to are not of a nature to create any doubt "of the expediency of introducing that system as soon as the requisite preparations "shall have been made for the purpose by means of cautious but decisive action on the "part of the Government."

The publication of the Report of the Parliamentary Committee is an era in the history of the progress of the question of the introduction of a Decimal Coinage in the public mind. It excited much discussion in newspapers, pamphlets, and other publications, as well as in the deliberations of public meetings and learned bodies; and not only the existing system and the scheme proposed by the Parliamentary Committee, but a variety of other schemes, which will be found in the synoptical table which forms part of the Appendix to this Report, found able and zealous advocates.

It is not consistent with the object of the present Report to enter into the discussion of the relative merits of the schemes so proposed, but it may not be considered inconsistent with it to point out that while each scheme claims, and perhaps with justice, in some one or more points advantages over the others, that all the schemes except the Pound and Mil Scheme abandon our present principal unit, the pound sterling, as one of the chief monetary units—that the Pound and Mil Scheme, which retains the pound as the principal unit of account, sacrifices the exact expressibility of the penny, halfpenny, and farthing in the proposed new coinage, and that of the other shemes, all, except the Penny, Halfpenny, and Farthing schemes, abandon the pound sterling as a unit of account, as well as sacrifice the exact expressibility of the present penny, halfpenny, and farthing in the proposed coinage.

Of these schemes the Penny Scheme appears to be, on the whole, the principal rival of the Pound and Mil Scheme in the number, the ability, and the zeal of its advocates.

In June 1854 an association was formed under the name of the Decimal Association, with the object of promoting the adoption of the Decimal System in money, weights, and measures.

To a deputation from this body, which, through Mr. Brown, their Chairman, urged on Mr. Gladstone, then Chancellor of the Exchequer, the immediate introduction of the Pound and Mil Scheme, Mr. Gladstone made the following observations, the importance of which may justify their introduction in this report :—

"I conceive that the intention of this deputation is that of a public demonstration "to awaken the country to a proper consideration of the question. For, although it is "true that we have had Royal Commissions and Select Committees of the House of "Commons to inquire into the subject, it has not, as I think, yet gone through anything "near that process of sifting in public opinion that would make it safe for the Government to take any decisive steps in regard to it. I cannot doubt that a Decimal "System of Coinage would be of immense advantage in monetary transactions. The "weight of authority on that head is altogether irresistible; but I do not think, when "we come to the adoption of a system, that we have obtained sufficient evidence as "to the sense and feeling of the country with respect to it. It is true that those "people who have studied and paid attention to the question of a Decimal Coinage "are unanimous in recommending it on account of the many advantages it possesses "over all other systems. Now, the people who have so studied the question are gentlemen who have been more or less actively engaged in commercial pursuits; but the "public at large do not seem to be acquainted with it. It is, as you are aware, the "enormous masses of the community who have immense business to transact that must "guide the Government in the matter. They are attached to the present arrangement "of the currency, as it admits of the different systems of divisors, and is the basis of "all their notions of value. It has also many facilities of division which you must "lose if you abandon it. It is impossible for you not to be struck with this—an advantage which takes its origin from the number of factors which a combination of the "decimal with the duodecimals give rise to. With the Government it is impossible not "to be so struck. Again, it is so wound up in the habits of the people, that it would

" not be advisable to have recourse to any change in it, unless we had clear evidence " that it was one the people themselves required and understood. This, too, is a ques- " tion in which the mere judgment of a Minister is of no importance, and which the " general feeling of the public can alone decide. I frankly own I am by no means " convinced that you can get rid of the penny; but as I said just now, nothing is more " unimportant on such a question than the opinion of any individual Minister. I would " only ask you, are the people prepared for the change? All I say is, that I cannot take " any decisive step until we are satisfied that the subject has been thoroughly sifted, and " is well understood by the public. Patience is never a good text to preach upon, espe- " cially to men who have laboured and waited long for the attainment of an object, " and I can well understand the feelings of Mr. Brown, who now expects some fruit " from his labours on this subject. I think that so far as it has been discussed there has " been a great deal of opinion expressed in reference to it, but I do not think from what " I gather from the press that the feeling in favour of it is so unanimous as you repre- " sent. I hope, however, that those who are engaged in this movement will persevere in " their labours until they bring it fully and fairly into the view of the public, when " discussion will, I hope, bring it to some practical result. As it is I feel that we are " not ripe for a decisive measure on the subject, and I think that the aid of Parliament " should not be invoked until we are ready for the change. When that change may " take place it will involve the re-adjustment of tolls, and such matters; a process which, " however important, is yet, when taken in connexion with the measure itself, a mere " matter of manipulation. Again, we must not lightly bring about a change which will " take a long time to work its way into the habits of the people; for Sir John Herschel, " no unfriendly witness, says that it would require fully twenty years to carry the " contemplated change into effect. Its perfect and full adoption by mercantile men " might be more immediate; for I agree with Mr. Brown, that it would be regarded " by them as a labour-saving machine, and as such be quickly brought into use; but " it would, I am persuaded, take a very long time before the people would become " habituated to it."

To a deputation from the same body which was subsequently received at the Board of Trade by Mr. Cardwell, then President of the Board of Trade, Lord Stanley of Alderley, and Sir James Emerson Tennent, Sir John Herschel, the Master of the Mint, being present, Mr. Cardwell, who had been a member of the Parliamentary Committee, made the following statement:—

"The Committee felt the advantage of obtaining the opinions of practical and " scientific men, and there was but one opinion amongst them as to the advantages of " the Decimal System. There were, however, more opinions than one as to the mode in " which it was to be carried into effect, and although we were very nearly unanimous " in thinking that the report we adopted contained the best plan that could be proposed, " yet there was a sufficient amount of scientific and of educated opinion on the other " side to render it desirable that public opinion should be further directed to the subject. " Your inquiries are, therefore, most valuable, as tending thoroughly to clear up the " subject, so as to procure general unanimity before anything like transition is attempted. " When you speak of a Decimal Coinage to be established amongst the less educated " portions of the community you must bear in mind that it is desirable that they should " be well prepared for its introduction. You have to change a great number of statutory " contracts, postage, tolls, and railway fares."

On the 12th June 1855 Mr. W. Brown moved the following resolutions in the House of Commons:—

1. That in the opinion of this House, the initiation of the Decimal System by the issue of the florin has been eminently successful and satisfactory.
2. That a further extension of the system will be of public advantage.
3. That an humble Address be presented to Her Majesty, praying that she will be graciously pleased to complete the Decimal scale, with the pound and florin, as suggested by two Commissions and a Committee of the House of Commons, by authorizing the issue of silver coins to represent the value of the one hundredth part of a pound, and copper coins to represent the one thousandth part of a pound, to be called cents and mils respectively, or to bear such other names as to Her Majesty may seem advisable.

After a protracted debate the first resolution was carried by a majority of 135 to 56. The second resolution was then carried without a division, and the third resolution was withdrawn. In the course of the debate the Government urged that it was inexpedient to make a change which would so deeply affect the interests of the poorer classes without much more investigation than had yet been given to it, and gave an assurance that the subject should receive the most careful consideration possible.

The next step taken was the issuing of the present Commission by Your Majesty, by which we are instructed to consider "how far it may be practi- "cable and advisable to introduce the principle of Decimal division into the "coinage of the United Kingdom."

Having thus traced the progress of the question of Decimal Coinage down to the issuing of this Commission, we had next to consider and define the precise subject referred to us by Your Majesty.

The questions of the decimalization of weights and measures and of international coinage were early forced on our notice. These are questions of great importance, and upon which probably much difference of opinion will exist. But they are not, we conceive, necessarily involved in the subject of our inquiry, and it appears to us that the terms of the Commission under which we act restrict our investigations to the practicability and expediency of introducing the Decimal principle into the coinage of this country, without contemplating any change in our present system of weights and measures, and without considering the possibility or advantage of an international system of coinage.

Under these circumstances, the weight of authority and evidence which we found had been already brought to bear in favour of the Pound and Mil Scheme by the recommendations of preceding Commissions, in the Evidence and Report of the Parliamentary Committee, and by the proceedings of the Decimal Association, led us to select our first witnesses from among the opponents of that scheme, and to postpone the examination of witnesses favourable to that scheme.

We accordingly proceeded to call before us, as witnesses, those persons who were understood, by their publications or otherwise, to be the most prominent and the best informed of the opponents of the recommendation of the Parliamentary Committee, and who were either supporters of the present system of coinage or advocates of the scheme known as the Penny Scheme.

The evidence of these witnesses will be found in the Appendix to this Report.

We likewise, at an early stage of our proceedings, applied ourselves to the preparation of a series of questions to be sent to foreign countries in which a Decimal Coinage had been introduced, with a view of obtaining information on several points, namely, the previous state of the coinage, the reasons which led to the introduction of the Decimal Coinage, the difficulties which had been found to attend the change, the extent to which the Decimal Coinage had been brought into practical use, and the result how far satisfactory or otherwise.

Copies of these questions were transmitted, on the 4th of March 1856, by our Chairman to Your Majesty's Secretary of State for Foreign Affairs, with a request that they might be sent to Your Majesty's Ministers or Consular Officers in the several countries to which they were applicable, and copies were also sent by different members of our Commission to personal friends, in those countries, who were known to be competent to give valuable information on the subject of the queries.

To these inquiries, and principally by means of Your Majesty's Ministers in the countries in question, and the courtesy of the Governments of those countries, numerous answers have been received, which will be found in the Appendix to our Report, and in some of the more important cases these answers have been accompanied by large and valuable collections of public documents relating to the changes in the coinage of those countries.

We also caused to be printed for the use of this Commission, and have included in the Appendix to the Report, several communications made to us in the course of this inquiry, various tables prepared for the Commission, and other documents, public and private, which we have found to be useful in the prosecution of our inquiry, and which we think may tend to promote a thorough sifting of the subject, and thus lead to a correct understanding of the subject by the public.

A series of questions has been laid before us, prepared by one of our members, Lord Overstone, described by their author as being drawn up with a view of bringing under distinct notice and examination some of the advantages of the present system of coinage, and some of the principal difficulties and

objections which have been suggested with respect to the introduction of a system of Decimal Coinage.

We do not consider that it would be expedient that the Commission should express, or that any grounds should be given to infer, any opinion on the subject of this paper, and therefore we feel it would be open to misconception if it were made part of our Appendix; but we have directed it to be printed as a separate document communicated to the Commission by its framer, and humbly submitted to Your Majesty.

Having arrived at this stage of the inquiry, and before proceeding to the other branches of the subject which still remain for investigation, it has appeared to us to be of importance for the satisfactory prosecution of this inquiry that we should make this Preliminary Report for the purpose of submitting to Your Majesty the information which we have obtained as to the state of the coinage in foreign countries, and the evidence of the witnesses already examined before the Commission, together with the other documents to which we have referred.

By these means we hope that the attention of Parliament and of the public may be directed to many important considerations and difficulties connected with this subject, without a careful examination of which no safe and satisfactory judgment can be formed.

By these means, too, we hope that the witnesses who remain to be examined will be better prepared to assist us in discovering, weighing, and answering the arguments and objections for and against the present system, and the various schemes which have been proposed.

Some important branches of the question still remain for investigation, and there are also to be considered some points of detail connected with the means and the difficulties of a transition from the present system to the Pound and Mil Scheme, or any of the other proposed schemes.

We therefore humbly submit this our First and Preliminary Report for Your Majesty's gracious consideration.

4th April 1857.

MONTEAGLE, Chairman. (L.S.)

OVERSTONE. (L.S.)

J. G. HUBBARD. (L.S.)

MINUTES OF EVIDENCE

TAKEN BEFORE

THE DECIMAL COINAGE COMMISSION.

Wednesday, 7th *May* 1856.

PRESENT,

The Right Honourable The Lord MONTEAGLE OF BRANDON.
The Right Honourable The Lord OVERSTONE.
J. G. HUBBARD Esquire.

The Right Honourable The Lord MONTEAGLE OF BRANDON in the Chair.

ROBERT SLATER, Esquire, examined.

Mr. R. Slater.
7th May 1856.

1. (*Chairman.*) You have turned your attention, have you not, to the question which has been referred to the Commissioners?—I have.

2. Are you aware of the terms of the Commission?—I believe that it is confined to the question of coinage; the decimalization of coinage alone.

3. The Commission is "for considering how far it may be practicable and advisable to introduce the system of decimal division into the coinage of the United Kingdom"?—Yes.

4. The subject is one to which your attention has been directed both as a writer and as a thinker?—It is.

5. You are the author of a treatise which you were so good as to lay before the Commissioners?—I am.

6. When was it printed?—I think in November last; indeed I was led to print it more for the purpose of laying it before the Commissioners than for any other reason.

7. Are there any points upon which your opinions subsequently to the writing of that treatise have varied from the conclusions which you adopted then?—My opinions have not changed in the least degree; but I would beg leave most respectfully to offer to the Commissioners the 10th and 11th chapters, which, as I think, comprehend almost all the points of investigation, and almost everything that I could lay before your lordships in my examination.

8. (*Lord Overstone.*) You are strongly impressed, are you not, with the expediency of introducing the decimal principle into the coinage of this country?—Not so strongly impressed in favour of the decimal coinage, but if we are to have a decimal coinage I should certainly prefer a decimal coinage having a small unit rather than a large one. I would prefer that, because it would thereby enable us to assimilate pretty closely to the coinage of France and America; but I am by no means an advocate for any change. I consider that our present compound system of coinage is a very convenient one for mercantile calculations, and unless I saw some advantage to arise from an alteration I should certainly not advocate a change for the mere sake of decimalizing our coinage.

9. You are not of opinion that the advantages of that mode of calculation, the saving of time, and other grounds that have been set forth by the advocates of the decimal system are sufficient to justify the country in embarking in the difficulties that are supposed to attend that change?—I am not.

10. If the decimal system of coinage is introduced you think that the reasons in favour of a lower unit than a pound sterling are very strong?—I think so.

11. Have you considered the difficulties which would attend any alteration of the pound sterling as the basis of our monetary system?—I have.

12. What is your opinion respecting it?—I do not think that the difficulties are to be compared to the advantages which a lower unit would certainly give if our currency were to be decimalized.

13. What are the advantages that you consider would attend a lower unit than a pound sterling?—My objection to the pound sterling as the basis of a decimal coinage is that it requires three decimal places, which I think a great inconvenience. The tenpenny requires only two decimal places, and, as far as banking accounts and mercantile accounts are concerned, it need only be confined to one single decimal place. My objection to three decimal places as to the pound is that you cannot withdraw any of those places from the account, because they are all too valuable. The third decimal place itself may be of the value of about $2\frac{1}{4}d.$, the second decimal place may be about 1*s.* 9*d.*, and, of course, the first decimal place may be 18*s.* or nearly that; therefore it is out of the question to expect that any reduction of those decimal places could conveniently be made if the pound were

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to be adopted as the unit of the decimal coinage. On the other hand, the first decimal place of the tenpenny embraces everything that is at present comprehended in a cheque or in a banking account or in a merchant's account. The introduction of a tenpenny unit would occasion no alteration whatever. Then I also object to the three places of decimals, the pound being the unit, because it would displace all our existing coins under 6*d.*, and would interfere, I think, rather disadvantageously with our calculations of quantities, such as we are accustomed to at the present moment. The binary divisions which we have, and the relative proportions which our weights and measures bear to our existing coinage, are so convenient, that we can readily make calculations even of a very intricate character without the smallest difficulty. Clerks who are in the habit of extending invoices, comprehending large quantities at exceedingly small values, find great facilities by our present system; and I very much question whether the introduction of the decimal system would improve that. I think the contrary. I think that it would be a great disadvantage to mercantile people, and would lead to a great many calculations necessarily upon paper which at present are done mentally. It does not appear to me that that would be any improvement at all. I will take as a single example the first that occurs to my own mind; 144 articles at 2¾*d.*; take that as a case, that is 12 dozen; and the rule at present is that we reduce the quantity and increase the price in the same proportion. We should say twelve dozen at 2*s.* 9*d.*; that is 33*s.* The process is done without putting pen to paper; and it is wonderful to see how readily experienced clerks make all calculations of that kind without having recourse to putting them upon paper; but I apprehend if you took a corresponding number of mils you could not arrive at a correct result, particularly if the price happened to be of a mixed character corresponding to 2*s.* 1½*d.* or some such price; you could not arrive at the result unless by a lengthy calculation upon paper. I offer that opinion with some qualification, because I cannot speak from my own experience as to the time such decimal calculations would require, but I speak with large experience of the other.

14. You state, do you not, in your pamphlet that in case of the introduction of a decimal coinage it would lead to an alteration in the mode of making up packages of things, and instead of making them up by the dozen they would make up parcels of tens?—I think so; indeed there always has been a habit of accommodating quantities to prices, and of late years particularly with some classes of goods. In the instance of hosiery, everybody knows that they are made up in dozens; but in the instance of lace goods, comprehending sometimes a large number of yards, they formerly used to be sold in pieces of every variety of length; they are now put up in parcels of 10 dozen yards each, or some such quantities, so as to simplify long calculations, the improvements by machinery in the meantime having so completely reduced the value of the article from the facility of production that there is a tendency at present towards a reduction of price generally in all articles that are produced otherwise than by hand labour.

15. If parcels were so made up in tens instead of dozens, do you think that any practical inconvenience would arise from the less perfect divisibility of the ten than of the twelve?—No; people would very speedily get accustomed to it.

16. The question did not allude to the difference of divisibility, but to the less possible divisibility of the 10 than of the 12; for instance, if you had a dozen pairs of stockings, or a dozen yards of lace, you could take the fourth part or the sixth part or the eighth part of those, but you could not take it if divided into 10; would that be a practical inconvenience in those branches of trade with which you are acquainted or not?—I think that it would be attended with no practical inconvenience to the wholesale trader, who only sells in large unbroken quantities. It is an inconvenience which would apply rather to the retailer, and he would accommodate his price accordingly.

17. (*Mr. Hubbard.*) Taking the particular sum that you mentioned, "12 dozen of any article at 2*s.* 9*d.* per dozen," you said that it could be done by mental calculation with great facility; but supposing that the price were in decimals, that the 2*s.* were a florin, and the 9*d.* were 3*c.* 5*m.*, if the prices ranged in that way they would run as evenly as the French prices do; the French do not take the odd centime; they generally stop at five or sometimes at two and a half; and to multiply 12 dozen by 1*f.* 3*c.* 5*m.* would be a process almost as easy as multiplying by 2*s.* 9*d.*?—I dare say it is, except where the quantity is very large and the price very small. I will mention another point with reference to the French system. I speak in that respect practically. In the house in which I am a partner we are very large importers of French goods, and of course we have to sell those goods in English money. I think it would be a very great advantage to importers if the coinage of this country were established upon the basis of 10*d.* as the unit, because money values would then assimilate so closely to each other with respect to the goods bought from France that it would only be a matter of deduction of a certain rate of discount from the invoice to equalize them, and this would be a great convenience in turning French prices into English ones.

18. Instead of making a deduction for discount from the price you would add something for profits?—That may be; we should find equal facilities in doing that; but we should regulate that by a per-centage.

19. The question of a uniform currency hardly comes just now under the consideration of the Commissioners; but is it not clear that any assimilation of value between our currency and theirs would be practically useless, unless it were absolutely identical?—Quite so. We could never make it absolutely identical.

20. Is it not the case that absolute identity of value never could prevail, until the same standard of value were established in both countries?—Even if they were the same they could not be relied on to continue the same for a single day, for variations in the exchange would immediately alter them.

21. So that your invoices from Paris, as the rate of exchange might vary from 25 francs to 26 for a pound sterling, could not be calculated at the same rate to find the selling price of the commodity in England?—Yes; it would be easily done. At the present moment it is the practice to take French monies as at 25 francs to a pound, whatever the rate of exchange may be; the difference of exchange becomes a matter of calculation with other expenses, and then the difference is regulated by a per-centage of the whole; but the simplicity of converting French money into our present monies by the simple multiple four, striking off the last cypher, is so great, that any little difference afterwards is to be regulated by a per-centage.

22. Practically speaking, you have already what you wish to have under a decimal system; you have now the means of converting at once any French price into an English price, at the rate of 25 francs to the pound sterling?—Yes; but that is not the correct exchange.

23. Under the proposed (tenpenny) system would you have more equable prices than you have now? Would there not be always some causes varying the rate of exchange, and with the variation of that rate of exchange must there not be some difference between the average rate of calculation you may choose to adopt and the actual cost, dependent on the rate of exchange at which your invoice will be drawn by your correspondent at Paris?—Yes; but if our denominations of money were equal, we should have only one process instead of two. I may mention another point,—and I sincerely hope that I shall be correct in my anticipations on that subject,—that the French ports may be opened for the reception of English goods; in that case it would be a decided advantage to the French people to have the English monies so regulated as to harmonize with their own.

24. (*Lord Overstone.*) You have had considerable practical experience in your business in retail transactions?—In wholesale transactions; our business is entirely wholesale.

25. So far as your observation and experience go, should you say that there is any practical inconvenience, or that there is not, in paying and receiving with our present coinage?—I should say none whatever.

26. You think that our present coinage is fairly and properly sufficient for all public convenience in the processes of paying and receiving in retail transactions?—I think so, decidedly.

27. You do not think that the decimal coinage, even if introduced upon your basis, would increase that facility?—I do not.

28. Do you think that it would diminish it?—I am not prepared to say that it would diminish it; but I think that it would be a great inconvenience, unless it were accompanied at the same time by a simultaneous decimal division of our weights and measures.

29. Have you considered the relative advantages or disadvantages of our present coinage, and of the supposed decimal coinage, with regard to the mental processes of calculation which the masses of people, especially of the lower orders, must frequently perform?—I am acquainted with the decimal processes usual in this country.

30. Do you think that the decimal system of coinage would facilitate the mental calculations which the lower orders of the people are continually called upon to perform?—I think not; on the contrary, I think that it would rather tend to destroy them.

31. Do you think that upon the whole, looking to wholesale transactions and to retail transactions, the general result of a decimal system of coinage would be to increase or to diminish the facility and conveniences of dealing with the fractional parts of a pound sterling?—I think it would have a tendency to decrease the facility of transactions rather than to increase it.

32. Do you think that a decimal coinage would increase the facility of adjusting transactions?—I do not think so, particularly if the unit was a high one, as I mentioned.

33. Have you considered, upon the supposition of retaining the pound sterling as the unit, in what way the decimal system would probably work with regard to the intermediate stages between the highest and the lowest money account?—So far as my attention has been devoted to that question, my mind is impressed with this conviction, that it would not work conveniently unless we could increase the value of the pound, that is, that we could make it divisible by 25 tenpennys instead of 24 tenpennys, as at present; then I think it would be a great convenience to have such a coinage; and if there were to be a coinage with the basis of 10*d.* as the unit, I consider that it must of necessity be attended with a gold coin of 25 tenpennys, because there would be no idea of substituting anything like a silver standard for the gold one. I consider a gold standard of great importance to be maintained in this country.

34. Are you conversant with the existing decimal coinages of other countries of the world?—Only with France and with America.

35. In both of those countries I believe the decimal system has only two monies of account, the highest and the lowest?—Yes.

36. With the decimal system, and a pound sterling for the highest or something more than a pound sterling, according to your suggestion, would it not be necessary that we should use more than two monies of account?—I think practically we should only use two monies of account.

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37. How do you think it would work, considering that the intervening stages must be 1,000?—More would be reckoned by the lower denominations. By mils if the pound were the unit.

38. Do you not think that great inconvenience and difficulty in calculations, especially in mental calculations, would arise from the necessity of dealing with sums so high as would necessarily be involved when you pass from 1 all the way to 1,000 without an intermediate stage or break?—I should think that there would be difficulties of that kind necessarily presenting themselves to the mind in large totals, but I do not know that the want of an intermediate coin would occasion any difficulty.

39. The question was not so much with reference to the want of an intermediate coin as the want of an intermediate stage or step for calculation. Do not you think that if you had, both in writing and still more so if you had in mental calculations, to carry the sums unbroken and unassisted by an intermediate stage from one to 1,000, when you came to the higher amounts above 100 great inconvenience and difficulty, and great liability to error, would occur?—Most undoubtedly; and that can be exemplified completely in the processes of mental calculation, to which we are at present accustomed by our existing system of coinage, because we make steps at various places. As in the instance of converting pence into shillings, we arrive at a certain stage of the process, and stop, and the mind carries it on until we reach another stage.

40. Under our present system of coinage we must carry our calculations at once from a penny to a pound, without the intermediate stage of the shilling?—Yes, in cases where the pence are an aliquot proportion of the pound.

41. Looking at the adoption of the intermediate stage of the shilling, is not that, in your judgment, a clear proof of the necessity of some such assistance between the penny and the 240 multiple?—Yes, I think so, because the decimal process could no longer assist the mind in arriving at a conclusion.

42. Do you not think that it would inevitably be necessary that we should use the florin or some similar stage to assist us in our calculations between a mil and a pound?—I am not prepared to say that a florin, occupying itself only one decimal place of a pound, would be any great assistance in calculations; but I have not attended much to that, having had no opportunity of performing decimal calculations, except incidentally. I do not think we should derive much advantage from taking any stage, whether the florin or the next stage, the cent, as the intermediate stage. I very much question it.

42 *a.* You have a strong opinion, have you not, that great confusion would arise in the adoption of a decimal coinage, unless it was accompanied by a corresponding alteration in our system of weights and measures?—I have.

43. Can you explain to the Commissioners the grounds of your opinion?—I entertain that opinion because the division of our weights and measures bears a close relative proportion to the division of our coinage, and by that means it greatly facilitates any calculations that are to be made arising from the parts of those divisions. It is the harmony that exists between the coinage and the division of our weights and measures that gives us those facilities.

44. (*Chairman.*) In your book you call the attention of your readers naturally, at page 8, to the vast varieties of weights and measures which at present exist, and you refer in the weights to the imperial troy weight, the apothecaries' weight, the diamond weight, the avoirdupois weight, the cheese and butter weight, the wool weight, the imperial long measure, and the superficial measure, and then you go on, at page 9, speaking most truly of the additional confusion that in practice arises from those customary weights, which, in despite of all law, have maintained their use amongst the people, "in stones, seams, or "trusses, as applied to hay or straw; in cloves, weys, or firkins, as applied to cheese and "butter; or cloves, stones, tods, weys, sacks, or lasts, as applied to wool." I believe you might have carried that nomenclature somewhat further. Taking into account the bolls in Scotland and barrels in Ireland, the confusion is infinite; and that being the practical state of our weights and measures, can we assume that, they varying in themselves without any integer from which they spring or to which they reach in the subdivisions which take place between those extremes, there is, practically speaking, any harmony, as it may be termed, between those almost innumerable weights and measures and the coinage?—The harmony is still the same, though the nominal weights are in themselves different; for instance, the divisions are the same, as we observe in the case of stones. A stone is sometimes 14 lbs. or 7 or 8 lbs., or a tod, or a wey. There are some of them of the same denomination, actually representing different weights for different commodities. Still the proportions of those weights bear the same relative proportion to the coinage.

45. Do they usually do so in all cases?—They do not.

46. You are probably not sufficiently acquainted with the matter to set us out those customary weights, so as to enable us to ascertain whether the confusion or the want of harmony which is attributed in reasoning to the substitution of the decimal coinage without the adoption of decimal weights is not an inconvenience which as you may say is at both sides of the question existing at present, and which would exist if decimal coins were introduced?—I have not sufficient practical acquaintance with that question to enable me to furnish the Commissioners with information on that point.

47. You have spoken of the facilities of the present mode of calculation, and you told the Commissioners that the commercial house in which you are a partner has large transactions with the Continent, with France, and probably with Belgium and Holland?—Yes; chiefly with France. We sell to Belgium and Holland; we do not buy there.

48. Do you find in those countries where the decimal system has prevailed for a considerable time, and in which the usual rendering of accounts is in francs and cents, any greater inconvenience in dealing in your own large concerns with those accounts in francs and cents, or in the money which is represented by those numbers, than you do in the coins of England?—None whatever. We do not sell the goods; we buy those foreign goods; but we keep our accounts in francs in all the transactions we have in France and some parts of Germany, and in Switzerland, where they actually invoice our goods in French money, and do not adopt the money of their own country.

49. You are aware that within a period relatively short they have adopted the French system in Switzerland?—Yes, I have understood so.

50. When that change took place did it produce any inconvenience in your transactions?—The trade had not arisen then between Switzerland and England, or between Switzerland and our own house. The character of the trade has changed in Switzerland within a few years only, through that country having adopted the manufactures of France very successfully.

51. You spoke just now about the practice in certain branches of trade and production of putting up and selling things in dozens, and you stated, did you not, that, probably as an incident to the decimal coinage there might be cases in which the parcels would be put up in tens rather than in dozens. Would that be an inconvenience to the buyer or to the seller?—I think it would be a great convenience to the retailer especially. He would know at once what his price would be.

52. You state at page 33, most truly, "Were a system of decimal coinage introduced "quantities would cease in practice to be put up in dozens. They would be formed into "tens, and as the tenth part of one penny, were a tenpenny unit introduced, is so much "more minute a fraction than our present farthing, the decimal system might be expected "speedily to reconcile itself to the convenience of the people. Quantities in harmony with "prices would be introduced to suit mental processes of calculation, and in a brief space. "when the people had been sufficiently trained, they would arrive at results by decimals "with great rapidity." There would be that tendency, you conceive, in matters, to adjust themselves?—Yes, I think so; it seems to be the natural bias of the human mind.

53. When persons have suggested that there would be any permanent difference in price by means of the introduction, or I should say, if it existed, the cessation of the decimal system, do you think that it would be possible, viewing the ordinary principles of supply and demand in the market, that there could be any permanent increase or diminution of price resulting from the alteration of the coinage?—No, I do not think that it would occasion any difference.

54. Competition would settle that?—Yes; that is governed by a different law entirely. Perhaps I might say, by taking the case of a single shilling divided into 10 parts, and divided into 12 parts, it stands to reason that of the 10 parts each contains a greater quantity and greater value than the twelfth part of the shilling, and if you can divide that shilling into no more parts, then the holder of the shilling must lose, unless he gets some extra quantity of the article that he is purchasing for the price that he is giving for it, the tenth part of a shilling instead of the twelfth. I refer to matters chiefly by which the sums of 10 and 12 can be subdivided, showing that the 12 is capable of division by a much greater number of times than the 10, and therefore is capable of showing a greater variety of prices in the same proportion.

55. (*Chairman.*) Are there not modes of adjusting the value of articles sold by the alteration of the quality of them somewhat?—Of course they are higher or lower in price according to the quality.

56. Suppose an alteration of the coin which placed in the hand of the purchaser a given amount of gold or silver or copper, not divisible, and that suddenly it was altered, either making it more or less, and he went to the market without having coins so minute in division as would meet the alteration in the weight and fineness of the coins which he had, in that case, if he were driven to buy an article in the market, might there not be a way of adjusting the price with precision by giving a better quality if there was more coin given, or a lower quality if there was a less coin given, and would it not adjust itself after that fashion?—It would and does so now, inasmuch as in a variety of trades, as in the grocery trade, and I am told in the spirit trade, if they have some small change to return they give it in the shape of an extra quantity, or they give, as I have understood in Ireland and elsewhere, a glass of whiskey to make it up.

57. Will you have the goodness to state whether, supposing the seller had the power, or endeavoured, upon a change of coinage, to put four per cent. additional into his pocket in the way of increased profits in the article which he sold, arising out of the difficulty of fixing the exact amount to be given for the new coin that was presented to him, that additional four per cent. so acquired by the seller in addition to any profits that he had previously had would bring at once a new competition into that trade of which the profits were so acquired, which would lower those profits to the ordinary rate of other profits in the trade?—I think so. His next door neighbour would immediately sell more at a reduced rate.

58. (*Lord Overstone.*) Suppose the integral part of any article, say a pound of sugar or a pound of tea, is sold for a given sum, when we come to divide this into fractional parts or ounces, for instance, is it not clear that the coin in which they are to be paid for would

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harmonise with those subdivisions, say of ounces, more conveniently if the original sum is divisible by 12 than if it is divisible by 10?—Certainly.

59. If then, under a division of the coins by 10 instead of by 12, we come to fractional sums to represent an ounce which are not stateable in figures or representable in coins, will there not arise a difficulty between the buyer and the seller?—There must, unless there is an equality of the proportions.

60. Can that difficulty be got over by any general principle of adjustment of prices to the ordinary rate of profit, or is it not a difficulty necessarily inherent in a different system of subdividing the integral price which must involve confusion and probable loss; that is to say, the turn of the price in favour of the one party or the other?—I think that refers to the difficulty in adjusting the integral price alone; and that difficulty, I think, would be rather increased than otherwise if the decimal coinage, whatever may be its basis, were introduced without a corresponding decimal division of the weights and measures.

61. Then the difficulty alluded to as arising from the subdivision of the integral quantity into its fractional parts will be greater under the nonintroduction of a decimal system of coinage to correspond with it than it would be if a decimal system of coinage were introduced in correspondence with it?—Precisely so.

62. You consider that a difficulty constituting an objection to the introduction of a decimal system of coinage unaccompanied by a corresponding decimal system of weights and measures?—I do.

63. The difficulty having reference to the fractional subdivision of the integral parts?—Yes.

64. Your transactions with foreign countries, more especially with France, are wholesale transactions, are they not?—Entirely.

65. You, therefore, in measuring the convenience of the currency of the country with which you trade have to deal with the multiple of the integer in your accounts rather than with the subdivision of it into fractional parts?—Yes.

66. But the question of decimal coinage has reference to the subdivision of the fractional parts exclusively. The decimal coinage has not reference to a decimal mode of multiplication of the integer upwards, but to a decimal system of subdividing the integer into its fractional parts?—Yes.

67. Your experience in wholesale transactions with foreign countries does not bear upon the question, one way or the other,—the convenience or inconvenience of the decimal system of subdividing the integer. It really has reference to retail transactions which correspond to the retail subdivision of the integer of our monetary system?—I am afraid that I do not understand you exactly. If the Commissioners will permit me I will explain what I believe to be the view that you are now taking of that question. We have nothing to do with the subdivision of the decimal currency of France in our invoices; but we convert that currency into English money, and we sell French goods in English money, without reference at all to the French money between us and our customers, after having adjusted the price, as I stated before, according to the expenses and the profit, which is necessary for us to take into consideration in that question.

68. So that in fact in your accounts with France you have to deal with the multiplication of their integer, be it a franc or any other integer, a great deal more than you are concerned with the mode in which the franc is subdivided into its fractional parts?—It is so.

69. Consequently, when you say that you find the French monetary system, or the Swiss monetary system, or the Dutch monetary system, equally convenient in large transactions with our own, that has reference to the mode in which the integer of the account is multiplied so as to give you the large amounts involved in your wholesale transactions?—Yes; but each individual invoice is formed of a great many goods all at an immense variety of prices.

70. Does that immense variety of prices involve, to any considerable extent, calculations in the fractional parts of the integer?—Every line of an invoice renders such calculations indispensable.

71. But the calculations are altogether calculations of multiplication rather than of fractional division?—Of multiplication only.

72. Again, with reference to your statement that if parcels were divided into tens instead of twelves, you thought that it would be an additional convenience rather than an inconvenience. In that answer you had reference again, had you not, rather to the multiplication than to the subdivision of those parcels?—It had reference, perhaps, more to the retailer than to any convenience or inconvenience that the wholesale dealer or manufacturer would experience from such a change.

73. In what way do you conceive that the retailer would experience convenience?—If a parcel formed of ten articles sells for one franc, or sells for 10*d.*, one article would sell for 1*d.*; that would be the facility that it would afford to arrive at the actual price of a single article.

74. Your answer has reference then exclusively to the supposition that you have a decimal arrangement of commodities to correspond with the decimal?—Precisely.

75. (*Chairman.*) Can you account at all for the practice that has arisen of making up certain articles and selling them in dozens, and other articles in other ways; as, for

instance, buying stockings or gloves by the dozen, which does not apply to buying shoes or other articles even of equal value to the stockings?—I have no reason in the world myself to doubt that that arrangement originated in the days of our forefathers, and when, as it exists now, 12 ounces were 1 lb. troy, and that it arose simply because it would assimilate with the division of the pound weight, and consequently with the coins which were so adjusted as to harmonize with the weights.

76. Therefore there is a tendency so to apportion the articles sold as to adjust themselves to the convenience of the coin in which the purchase is made?—Yes; I quite think so.

77. How shall we account for this, for instance,—a fact with which some of us are familiar as country gentlemen,—they sell sheep by scores?—That is entering again into the old division; that applies in many cases, as in the case of hundreds between wholesale and retail dealers. In some places 1 cwt. is 120 lbs., called a "long hundred," while the standard weight is 112 lbs. to a cwt.; and there is no giving any reason, except the desire, arising from competition originally, to throw in a little more as an additional inducement to buy, like a baker's dozen.

78. You have been asked upon a very important question as bearing upon this subject. In the great wholesale operations which your house conduct you have told the Commissioners that your proceedings would naturally be to a considerable extent in multiplication rather than in the division of articles. In the transactions of the market itself, in small transactions of the persons under your employment, do you consider that the calculations by division in the market are more important to them than the calculations of multiplication?—I should think that they were equally important.

79. Are you aware of a popular book which is published for the purpose of despatch in the market proceedings of parties less initiated in accounts, called the "Ready Reckoner?" I have often seen it.

80. Are you not aware that the "Ready Reckoner" is altogether for giving facility in multiplication for the operations in the market?—Yes; but it is seldom used.

81. It has been used for some centuries?—Yes, it is very common; but it is never used by clerks; it is only used by small traders. You would be astonished at the facility with which grocers and others calculate quantities without such aids. They would be ashamed to use this book; and if a clerk were to use it he would lose caste directly. I would at once discharge him.

82. Do they not in some of the greatest establishments in the world with which we are familiar enough make use of tables of computations that are made use of for exactly the same purpose?—I think not, except the interest tables.

83. In that book, such as it is, it is altogether a process of multiplication?—Entirely.

84. (*Lord Overstone.*) Is there not a difference between dealing in commodities and dealing with values?—Very great.

85. Commodities are necessarily divided, while values are naturally added?—Not always added. We are obliged to take all the rules of arithmetic with the values; but with commodities they are either simple multiplication or simple division. It is a very short process.

86. Is not the great familiarity of the terms "halves and quarters," &c. conclusive practical proof that division has reference to commodities, and is a process of universal daily and hourly practice?—Undoubtedly.

87. (*Chairman.*) In what you have referred to, as well as what is more plainly set out in an extract from Mr. Laurie's book under the head of "(G.)," you refer under note "(G.)" to the process that you have already described in your oral evidence, the consequence of the stimulus given by improved machinery or the application of machinery in acting upon productive labour, and lessening the cost of particular articles?—Yes.

88. From which the inference has been drawn by Mr. Laurie that the unit or integer, for the convenience of parties, ought to be lessened rather than increased; is not that so?—Quite so.

89. The articles are given, and other articles that would occur, such as pearl shirt buttons, sewing cotton on reels, and needles, and pins, and all those articles which are cheapened very much in production, and are now unrepresented in the smaller denominations, if it were a single needle or a single pin, by any one coin that ever has existed or ever can exist. Then, so far as this table goes, ought we not rather to look to the price that would be paid for that quantity of the article which would be ordinarily sold than for the estimated cost of the articles in detail, which in detail are never purchased?—Quite so. It is the power to purchase them in detail.

90. Surely in those things that have been named to you, buttons, or pins, or reels of cotton, they cannot purchase them in detail without having a coin to represent it; therefore is not the argument fallacious?—It is not altogether fallacious, for this reason, that though the price of an article or a gross of articles sufficient for the wants of a poor person may be 1*d.*, in a month hence, by the improved machinery, it may become ½*d.*; that is, he may get a double quantity. He does not want a double quantity; he does not want as much as a penny's worth. If it is a button to his shirt, he does not require half a gross of buttons for that single purpose. Therefore I apprehend, so far as the poor are concerned, a small coin is indispensable; smaller even than our present farthing.

91. Are you aware that there has been an attempt made by the Government, upon that hypothesis, to coin half-farthings, and that they have not been taken by the people?—I

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have seen the coin, and it appeared to me that there never seemed to be any great desire that the people should take them; they never circulated very widely.

92. Are you aware that in the last report made from the Mint of the United States to Congress there is a statement made that the half-cent which had been coined for some time was found so entirely useless that they had recommended a cessation of the coin?—I can readily believe that, because I believe it is not the interest of the trader, the person who sells, to have such exceedingly small coins, though it is the interest of the poor to have them, so as to be able to command the commodity. It is directly the interest of the trader to compel his customers to buy more than a small quantity. I look upon that division as rather important, in the calculation of the original prices of manufactured articles, which go very low indeed, rather than as to coins representing those prices which we have in our business for articles, representing the 32d part of a penny; but we have no coin, and we require none, to represent a value so small.

93. Would not that apply in the same way to those illustrations which are given in some of the books, say a hank of cotton, though a very small fraction by the pound; and is not that rather a standard of estimating sums which will be paid in larger amounts?—It is exclusively the mode of calculating. It appears here in this book as a difficulty, or rather it shows the greater difficulty we should have by calculating the decimal parts of a pound, than we have at present by the decimal parts or fractional parts of a penny; but we have no coin, and we require none, to represent it; it is merely a question of calculation with reference to original cost; nothing else.

94. Therefore the supposition that because cotton per pound is very low there would be a necessity for a small coin corresponding to the hank of a pound of cotton is ill founded?—It is so entirely; but I wish the Commissioners to see this point in connection with it, that in calculating the 32d part of a penny by mils of a pound or anything equivalent to it you would find that you would require no less than five figures to do it; there is the difficulty as a matter of account. As an example of the difficulty experienced in commercial operations of hourly occurrence in a country possessing a unit of a decimal coinage smaller than £1, and of the inconvenience in the transactions of life of a minute decimal subdivision, I beg to quote from a New Orleans price current just received the rates of sundry articles:—"Louisiana sugar of fair to fully fair quality is quoted at 7 to "$7\frac{5}{8}$ cents ℔ lb; ginger at 6 to $6\frac{1}{8}$ cents ℔ lb; tobacco at $7\frac{1}{8}$ and $8\frac{3}{8}$ cents ℔ lb (and "also, *exceptionally*, amongst a multitude of quotations exhibiting binary subdivisions at "$7\frac{8}{10}$ and $8\frac{7}{10}$ cents). Green meat (pork) found purchasers at $7\frac{1}{8}$ cents ℔ lb, and lard at "$9\frac{3}{8}$ to $9\frac{5}{8}$ cents. On cotton the advance within the week has been fully $\frac{3}{8}$ to $\frac{1}{2}$ cent ℔ lb, "whilst freight to Liverpool was taken at $\frac{5}{16}$ to $\frac{3}{8}d.$ this year, against $\frac{1}{4}$ to $\frac{11}{32}d.$ in 1855, "and $\frac{13}{16}$ to $\frac{7}{8}d.$ in 1854. To Havre cotton is taken on freight at $\frac{5}{8}$ cent. A ship was "taken for Bordeaux to $\frac{15}{16}$ cent, and at Boston at $\frac{7}{16}$ cent," whilst we look in vain for any decimal quotation of freight. Amongst the articles fluctuating in price by $\frac{1}{4}$ cent are found almonds, bacon, bagging, coffee, hides, lead, rice, soap, spirits; thus showing that a binary division is preferred for practical purposes by a people already possessing the supposed advantages of a decimal monetary system.

95. (*Lord Overstone.*) Are the Commissioners to understand your view to be this, that for the purpose of representing, not in coins but in calculation, those minute values which are often necessarily involved in mercantile transactions, the present system of division is more convenient and more efficient than the decimal system?—Yes.

96. Secondly, I understand your view to be that a coin of a very low denomination is favourable, not to the seller or to the comparative wholesale dealer, but to the poor purchaser, as enabling him to get smaller values at a less sacrifice?—Yes.

97. (*Chairman.*) Do you conceive that if it was for the interest of the buyer or any considerable class to obtain a coin which the Government had coined, and they found it advantageous to them in their transactions, that that coin would not be had somewhere or another?—I do not know a class more indifferent in this matter than the poor themselves; they are the last persons to know what is best for them; they would readily use it if they had it; but they are not the people themselves, I apprehend, to move in the matter; they are always passive.

98. Do you think that it is a process of that description, a want of activity and an immediate sense of their own interest, which would lead at once in England to the cessation of the half-farthing and in America to the cessation of the half-cent?—I think so; they submit to the force of circumstances.

99. The statement made in the report of the Commissioners sent to Congress is that the people found it exceedingly troublesome and inconvenient to pay a cent by two coins when they could pay it in one?—The poor in America and the poor in England are very different; there is little poverty there compared with this country.

100. With reference to some questions I put to you antecedently about the possibility of any class in the community adding 4*l.* per cent. to their own profits without at once raising a competition that would bring down that 4*l.* per cent. to the ordinary rate of profits in the country, I wish to ask you whether the change proposed from the 960 farthings to 1,000 mils could by possibility lead to a standing confiscation acting upon the poor to the amount of that 4*l.* per cent.?—No, I do not think anything of the kind.

101. Supposing any change in the coinage were made, do you not think it of great importance that it should be made in such a way so as slightly as is possible to affect existing fixed contracts?—I do so, certainly.

102. Is not the effect that might be produced upon fixed contracts, whether it is in the toll of a bridge which is a halfpenny, or whether it is in the more material contracts entered into by the State, one of the great difficulties in making any change in the currency?—I am quite satisfied upon that point.

103. Will you have the goodness to state whether you consider that the majority of the fixed contracts are represented by the price of the gold and silver coin of the realm, meaning by that, from the shilling upwards to the pound, or any decimal below a shilling?—If I took the number alone I might give a very successful answer to that question by referring to postage and receipt stamps.

104. Those are concerns of the State. The question had reference to fixed contracts between individual and individual. I mean a contract even of the humblest description?—I should say that contracts are generally above a shilling, except ordinary purchases of wares.

105. My question referred to fixed contracts?—Then there is no doubt about it.

106. You are aware that the scheme which calls itself commonly the mil and the pound system preserves as they now exist all the existing coins from the sixpence upwards to the pound as they now stand?—I believe so.

107. Then whatever possible collateral inconveniences might arise from the adoption of the mil and the pound scheme, has it not at least that advantage of leaving the greater part of the fixed contracts of the country undisturbed?—I am not aware that that could have much to do with the question. I do not exactly see the operation of that question; it does not convey itself clearly to my own mind. If I fix upon, as I will imagine, contracts to furnish a certain quantity of goods at a certain number of pence each, they would most assuredly be interfered with by the decimals of one pound. I might enter into the furnishing of the army with a large number of articles at 4*d.* or 3*d.* each; those would most assuredly be influenced by the proposed decimal division of one pound; while, on the other hand, there must be a great number of articles which would not be affected by such a division; but whenever you come to a broken price, I mean such a price as 2*s.* 4*d.* or 2*s.* 3*d.*, which is common, as, for example, in contracts for shoes, if we will give 5*s.* 1*d.* a pair or 14*s.* 3½*d.* a dozen, that is always with reference to the existing coinage, then I should say that the introduction of the decimal coinage with a pound as a unit would most assuredly interfere with that contract.

108. With respect to any future contracts to be entered into after the change had taken place, I presume those contracts being entered into in relation to the coin that was then made by law would adjust themselves according to the new system?—Most assuredly.

109. Confining yourself upon that ground to the antecedent but permanent contracts, supposing a contract was made to pay 2*s.* a week for a poor man's bed in the lowest part of Westminster, if a change took place, would he still be enabled to satisfy that contract by the payment of 2*s.*, namely, the same coin that he had previously contracted to pay?—Yes, he would; but I suppose again, that if I entered into a contract with a man to pay him a pound a week, of course if he was to get a sixth part of it to day, I could not by decimal of a pound arrive at the precise value so as to enable me to fulfil my contract, as the day's wages is an indefinable quantity.

110. Supposing it was a pound, he would have no difficulty in paying 20*s.* at the end of the week?—None at all, but it is the parts that I am looking to.

111. Suppose he paid at the end of three days, he could not have any difficulty at the end of three days in paying 10*s.*?—None.

112. The utmost inconvenience would be if that contract for paying wages at a pound a week resolved itself into a division of time that was not represented by any corresponding division of coin?—I believe that in all contracts of that kind in which labor is concerned, whether for a week or a month or yearly salary, when it is to be paid in proportions, it would be affected, although of course in a very small degree; and except as a matter of minute correctness I would not raise the question.

113. (*Lord Overstone.*) Under the proposed decimal system called the pound and mil system, all sums involving a penny otherwise than multiplied by six or by 12 would be absolutely inconvertible into the new coins at precisely equivalent values?—Yes.

114. Consequently all contracts involving such multiples of a penny must when paid in the decimal coinage involve gain or loss to the one side or to the other; upon the supposition of a decimal coinage based upon the penny, no such difficulty would arise in any sum?—None whatever.

115. Every sum would be strictly convertible into equivalent values?—Yes.

116. Whatever the contracts might be, whether in shillings or whatever sum, there would be under the penny basis of a decimal coinage the power of conversion into any coin of precisely equivalent values?—Yes.

117. The difficulty therefore of converting existing contracts involving multiples of a penny into the new coins is applicable only to the decimal coinage which takes the pound sterling for its basis, and is not applicable to the decimal coinage in any part of the process of converting the new coin into a decimal coinage which takes the penny as its basis?—Precisely.

118. (*Mr. Hubbard.*) There are two or three points very strongly treated in your very interesting pamphlet, upon which I wish to receive information. You state that you are familiar with the French system of coins; therefore, of course you are aware that under their decimal system the French succeed in regulating their prices and recording their

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transactions with equal or greater facility than under the old system of sous and francs?—I am not conversant with the habits of the common people there in accounts. In business transactions we have no difficulty at all.

119. I imagine that you would not doubt that in the event of the decimal system in this country being adopted, prices would be easily estimated under the decimal system, and that the transactions arising under it, and the records of them, would be effected with perfect facility?—Yes; I think they would speedily adjust themselves to any change.

120. Under the present division of the pound sterling, the minimum coin is a farthing or the 960th part of a pound; under the proposed pound and mil scheme the smallest coin would be a mil, being the one thousandth part of a pound sterling, and therefore smaller than the farthing by four per cent.?—Precisely so.

121. You would therefore admit, would you not, that there would be no difficulty if you descended as low as a mil in the common treatment of prices, and in the common record of transactions in estimating as closely and calculating as accurately as you could possibly wish?—Yes; we should find the means of doing so.

122. Will you have the kindness to refer to page 50 in your treatise, where you state, "the decimals of one pound, although pronounced to be the only system adapted for the "wants of the country, are utterly and altogether impracticable for the ordinary purposes "of business." I imagine that that inference is a consequence of the calculations which precede it?—Yes, I refer to that.

123. Now will you allow me to direct your attention to the first rule there stated, "By "the simple rule 3,612 yards at $3\frac{3}{16}d.$" By the simple rule you mean the rule commonly pursued now?—Yes, precisely so.

124. The number of figures I find occupied in bringing out that rule are 46. The next rule which you show is a supposed operation of the same kind of transaction under the tenpenny decimal system?—Yes; the simple rule is the practical rule.

125. In the third instance you show the calculation of the same 3,612 yards under the pound and mil system?—Yes.

126. The figures by which you represent the $3\frac{3}{16}d.$ are ·01328125, which you have taken as the precise equivalent of the $3\frac{3}{16}$?—Exactly so.

127. But under the decimal system there is no reason whatever to suppose (by the analogy of the custom of France) that prices would not be estimated in decimal money by far fewer figures. If you descend to the same amount of detail as $3\frac{3}{16}$ you may suppose $3\frac{3}{16}d.$ to be represented by 1 cent. 3 mils?—Yes.

128. Suppose that you went further, and took $13\frac{1}{2}$ mils or 13·5 mils, the use of three figures, including a decimal below a mil, would allow a variety of price far exceeding what you could get by sixteenths of a penny, and therefore we may assume that you never need to go below that. If then you take 3,612 yards multiplied by 13·5 mils, you will find that the whole calculation will be accomplished in 27 figures, and with great simplicity. I apprehend that such would practically be the way in which the decimal system would operate?—I beg pardon. I understood you to say if we multiplied 3,612 by 3 mils.

129. 13·5 mils?—You must remember that you must have two decimal places before that on the left hand side.

130. Those decimal places being filled with blanks?—Yes.

131. I observed that in answer to some previous questions you insisted as a disadvantage to the pound and mil scheme that it required in all instances three decimal places. By that I understand you to mean that if you are dealing with mils only you must still precede the mil by 3 zeros representing three decimals, but if, on the other hand, you are dealing with pounds sterling, you must put three decimals after it to mark its affinity to the mil. I am not aware that the advocates of the pound and mil scheme make any stipulation that a useless retinue of zeros shall always either precede or follow the precise coin with which they are concerned?—I do not see how they can help it.

132. I apprehend that as, under the present system when you wish to speak of pounds, you speak of pounds simply, so you would do under the decimal system, as now when dealing with pence and farthings. In this very calculation, for instance, you speak of them without reference to shillings and pounds; so under the decimal system you would speak of whatever coins were concerned, cents or mils; you would make no unnecessary mention either of florins or pounds?—I do not see how you could distinguish the one from the other. I believe your suggestion is one that would be likely in practice to be carried into effect. People would occasionally put down some stroke to indicate that that which followed was a mil, as they do at present with 1/1; they put 1 for the shilling and a stroke between it and the penny. I fear it would lead to very great confusion, from the great number of decimal places. At present we have got only pence, and a farthing is a thing so well understood that we have no difficulty in distinguishing it.

133. I must assume for the position that I am putting to you that the cents or mils would be distinguished by some mark, C. or M., as we do now with £ *s. d.*, in which case I reject the preliminary retinue of cyphers, and simply place upon record the 3,612 yards multiplied by 13·5?—This might be taken for 135 florins. You put a decimal point after the 13; there is nothing to show that that is a decimal. There is the difficulty that I see in practice.

134. Whoever makes the calculation knows what he is dealing with?—Yes, but it comes into the hands of some person afterwards that does not know.

135. You have only to put your mark against it. Might not the same thing occur now? Might not 135 be 135*l.* sterling or 13/5?—I dare say we shall find modes of making it understood, but when we are investigating things of this kind at first these difficulties will naturally present themselves to the mind as almost insuperable. I cannot see how they can get over that difficulty. If you run into the lowest decimal place that the decimal division of the pound admits of, I think it would lead to difficulty and mistakes. I dare say we shall find means of getting out of the difficulties, but at present I do not see how.

136. (*Chairman.*) There are three figures that enter into the French calculation. Suppose a single franc, or one franc two centimes. Under the English system, as proposed, there would be a point which I should take as analogous to a franc, and three figures instead of two. Do you consider that the addition of that single figure is a difficulty that is worth very much?—I think it is a very great difficulty in calculation; it does not necessarily follow that it will always be a cipher; it may be something else.

137. Suppose the French were able to reduce their system to a franc and a simple figure, in place of two, do you think that that would facilitate the matter very much?—I think it would. That is the suggestion I have made with reference to dropping the halfpence, which is customary with bankers and merchants.

138. (*Mr. Hubbard.*) I will pass on to the last point, which will illustrate my meaning. At the bottom of page 51 you impugn the advantages which the advocates of the pound and mil scheme ascribe to it as a medium of keeping accounts?—Yes.

139. You illustrate your objections to their theory by the tables which are in page 52. In the first column of that table you state 20 sums expressed in pounds, shillings, and pence?—Yes.

140. In the next column you state the equivalents of those sums in decimals of a pound; but you carry those decimals below a mil?—Yes.

141. In practice we agreed just now that no record would be made of any sums below a mil, the mil itself being below a farthing. If therefore you strike out of that second table or column the figures less than a mil, and add up the remaining figures, we shall find (as stated in your own paragraph below) that the addition of the decimals will be 107 figures; the addition of the pounds, shillings, and pence being 101?—Quite so.

142. I take the comparison of those two columns as a fair illustration of the number of figures required by the one and the other system?—Yes.

143. They show, therefore, that the decimals required rather more figures when carried down to the details of mils (which we assume to be inevitable); but that, on the other hand, they have, first the advantage of the greater accuracy of detail by going to mils than stopping at pence only, and next they save the intricacy of adding up and dividing by 12 from the pence and by 20 from the shillings, the addition of the decimals being simple addition throughout. Setting aside, therefore, the question of how you would treat the subdivisions of a pound in order to avoid confusion, I think it is obvious that if you do not go into greater detail than mils both the calculations and the accounts are less laborious, and that the accounts require a very few more figures under the £ and mil than under the present system?—I think the proposed new system is more laborious. I understood you of course that we must go into mils; because the very last member of the mils of the third decimal place may be worth more than 2*d.*, and we cannot drop it; but you will observe that in that case it must be an elaborate calculation in all instances to produce such a result as that. If you compare the number of figures with the figures on the opposite side, in dropping those fractions of a mil altogether, you will find that there is in no case less than five figures; while in many of the other cases by shillings and pence there are only four figures to indicate each amount, and of course to produce those five figures must be a much more elaborate process than to produce four. You will find, however, that the decimals in the third column of the tenpenny divisions present a much smaller number of figures than either of the two, I think.

144. You draw a distinction in the next paragraph between the millesimal system and the pound and mil scheme?—The millesimal system is what I understand by the pound and mil scheme.

145. You say, "If, however, the millesimal system were introduced, and that not more "than three places of decimals were used, at the expense of precision in amount, the "number of figures would be reduced to 107"?—Yes; "while 7⅓ mils would be lost in "the amount of the total."

146. That would be lost as a matter of conversion, not as a matter of simple account in adding up?—It would no doubt be a small loss even the whole of those fractions. We are supposing that farthings are dropped altogether in the system of pounds, shillings, and pence, and are taking the equivalents here; in that case, suppose you had got the benefit by those five figures of the lowest mil which comprehends farthings, then there are the fractions of those mils, or the decimals of those mils, following, and those mils together in that total amount to 7⅓, being something less than 2*d.*

147. It is not a question of equivalents of values; it is rather a question of ultimate saving of labour in the keeping of accounts upon the decimal as compared with the present system; the addition of the 20 sums stated here in decimals is a process involving, it is true, six more figures in use, but a saving of time by avoiding the division of the pence by 12 and of the shillings by 20?—I confess that I never felt the loss of time in that. I think a great deal more is said about that than it is worth; but there is a larger amount of

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figures necessary by the decimals of a pound than by the other two processes, as I think is quite manifest from those tables. Here is a case, at page 54, where small amounts are represented. It says, "one decimal place, therefore, may be all that is considered necessary "in the case of the tenpenny, while the whole of three decimal places must be used in the "instance of the pound, and even then without producing an exact result. In small "amounts this is exemplified in a striking manner; for example" (see Table end of Chapter X.) Without the decimals of a mil the figures are no less than 31, compared with 21 represented by the other, our present system; while the tenpenny comprehends only 17 figures and no more; that shows, I think, incontestably and unanswerably, that the tenpenny is the least laborious system of the three; it requires fewer figures than our present system, which requires 21, and the other requires 31, including fractions.

148. 21, exclusive of fractions, are the number of figures engaged in the representation of five sums under the pound and mil scheme; 21 are equally the number of figures engaged in representing the pounds, shillings, and pence?—Yes.

149. In that instance there is a parity of numbers?—Yes.

150. Will you permit me to refer to the question touching the foreign exchanges, at page 57? You remark that there might be an advantage in the change of our coinage as illustrated in the matter of foreign exchanges, and you observe that "the rates in the "majority of instances are quoted in foreign monies of a variable amount, and compared "with the fixed sum of £1 (which is, however, an anomaly, as persons buying or selling "generally value the fluctuating worth of an object by the money of their own country)." That anomaly is a matter upon which I shall be glad to have a little information. I observe, at page 58, you support that view of its being an anomaly by remarking of its converse, that it is "the mode in use in almost every other country of importance, and which "is undoubtedly the most natural, by deciding upon a fixed valuta in foreign coins to be "valued by a variable valuta in British money?—Yes.

151. You would express yourself in this way; the anomaly consists in London taking a variable quantity of foreign coin in exchange for a pound sterling?—Yes.

152. And the improvement that you would suggest is, that London should give a variable value for foreign coins?—A variable value.

153. Which is the practice now pursued with most countries with which our foreign exchanges are conducted. But does not this difficulty arise, that if London gives a variable value for foreign coin foreigners must give that fixed coin for our variable value?—They would regulate it according to their own arrangements, as at present, in drawing upon us. We have nothing to do with what they would do on the exchange in France; but in regulating our own exchanges we should give so many cents of tenpence. I am supposing the lower unit is here introduced. I am raising this argument with reference to the lower unit, and not with reference to the high one, proving that the decimals of a pound are inconsistent with that minute division which we at present observe with reference to certain markets, such as St. Petersburgh and Madrid, where the difference varies, generally the eighth of 1*d.* only, so small is it. I mean to show that the tenpenny is capable of a more minute demonstration than the decimal of a pound would be. I have put down calculations here to establish that principle. I think I may also say, with reference to the foreign monies, and the course of exchanges of different countries, that by purchasing a certain quantity of their money, such as in Amsterdam 100 guilders, the exchange might be regulated to a per-centage of the tenpenny, say five cents of 10*d.*; that would be an easy mode of calculation, showing the tenpenny itself to be simpler in arriving at results.

154. You have now raised another question, and that is whether our exchange operations would be more convenient or advantageous if one of the equivalents was not so high as 1*l.* sterling?—I think a low equivalent would be most advantageous.

155. The position I understand you to take here is, that it is an anomaly in the exchange operations of this country that we should take a variable quantity of foreign coin in exchange for the pound sterling; that we ought to follow the example of the chief foreign countries, in giving a variable quantity for the coin of the country with which we are in negotiation?—Yes.

156. My question is this: If we reverse our position, say with France, and instead of taking a variable number of francs for a pound sterling, give them a variable number of pence for a franc, must not France be placed in the anomalous position in which we are now, giving a fixed coin and receiving a variable equivalent?—No doubt about it, as a Parisian would regard the London quotations; but it would occasion no alteration in the principle pursued on the French bourse, as Paris would doubtless fix on a fixed valutation, in British coins.

157. Convenience seems to have established, that whereas London gives the variable value to St. Petersburgh, Madrid, Naples, and Lisbon, those cities shall give the invariable value, whether the bills be drawn on their own bourse or in London; and that whereas London gives the invariable £ to Amsterdam, Hamburgh, Paris, Berlin, and Vienna, those cities shall always give the variable value, whether the bills be drawn on their own bourse or in London. So long, therefore, as this correspondence of practice prevails, must not the anomaly complained of attach to the one or to the other country?—As regards exchanges between London and the respective countries you name, the anomaly complained of certainly must attach while the practice you allude to continues. But as between themselves foreigners as an almost invariable rule already avoid occupying this anomalous position, exchanges between any

two cities being generally regulated on the same principle as that obtaining between Paris and Vienna. Thus, Paris quotes the exchange on Vienna at 247 francs for 100 florins, whilst Vienna quotes Paris at 119 florins for 300 francs, each adopting its own money as the variable measure of value.

158. Upon the other question which you have raised incidentally, namely, the disadvantage of the high value of the coin which is our chief measure of exchange with other countries, you seem to intimate that we should deal with them upon more advantageous terms if we had a smaller equivalent, because the subdivisions would be more minute?—Yes.

159. Are you aware what the subdivisions of the franc are in the exchanges with London? Do you know how the exchanges run between Paris and London?—I believe they go as low as 2½ centimes.

160. If then we find that in the equivalent that we receive for a pound sterling France measures never more closely than two centimes and a half, it is quite clear that no gain could be derived from exchanging the pound sterling as our fixed value for another, because it is now capable of receiving an equivalent graduated as closely as convenience permits?—At the present time that is so, in the case of the French exchanges. The question is whether it would be so in general under the decimal system with the pound as the unit.

161. Under the decimal system, the pound sterling remaining as it is now, the rate of exchange would not at all be affected; it would only affect those exchanges where we give pence for a foreign coin?—Yes; that is a point of very great interest; it is one that I should indeed feel glad to see more closely inquired into, as the decimalising the pound might occasion much inconvenience in certain exchanges, and would not correct the anomalous position in which we now stand. When I wrote upon this subject, my own experience not enabling me to speak very decidedly upon it, I was tempted to show the differences, rather to attract the attention of those better acquainted with the question than I was myself, and I thought the smaller unit in such cases might lead to very great improvement.

162. (*Lord Overstone.*) I wish to draw your attention to the question of the general convenience or inconvenience of the decimal coinage, especially the pound and mil scheme, as compared with our present scheme, with regard to the transactions of the lower classes in small amounts. Will you have the goodness to look at this table (*handing the same to the witness*), in which I have converted a penny, and every multiple of a penny, up to 11*d.* into the approximate values in mils. By that table I think you will perceive that if you take a penny, and all the multiples of a penny under a shilling, and add them together, the total sum involves 13 figures?—Yes.

163. By this table you will observe that the addition of a penny, and every multiple of a penny under one shilling, involves 13 figures, whilst the addition of the corresponding approximate value in mils involves 20 figures?—It does so.

164. The total sum of the pence so added gives 66 pence or 5*s.* 6*d.*?—Yes.

165. The total sum added in mils gives 270 mils, or 2 florins 70 cents. I wish to ask you whether upon the examination of that table you think that the convenience and accuracy of the transactions as regards the poorer classes would be greater under the present penny system or under the proposed mil system, as regards accuracy and convenience, both in writing and in mental operations?—I think it would be more convenient under our present system; it embraces a smaller number of figures, and is easily and readily comprehended by them.

166. Is it not more easily carried in the mind?—Yes, I think so.

167. For the purpose of testing that more in detail, I will take the case of 11*d.* as represented by 45 mils plus 10*d.*, represented by 41 mils plus 9*d.*, represented by 37 mils 11*d.*, 10*d.*, and 9*d.*, give 30 pence or 2*s.* 6*d.*; the equivalent values in mils will give 123; do you not think that it would be far more easy for the poorer classes to go through that process under the pence system than under the mil system?—I think so, undoubtedly.

168. Take again another case:—2*s.* 4*d.* will be represented by 116 mils, and 2*s.* 8*d.* will be represented by 133 mils; which do you think would be the most convenient and most accurate for the poorer classes, both in writing and in mental calculation, to know that 2*s.* 4*d.* and 2*s.* 8*d.* make 5*s.*, or to ascertain the value of 116 mils added to 133 mils?—I think that there can be no question that the shillings and pence system is most easily understood.

169. As to those sums, again, represented by 125 mils, 2*s.* 6*d.* added to the preceding 5*s.* would give 7*s.* 6*d.*; do you think that that would be a more convenient process for the lower orders to perform, in writing and in their minds, than the addition of 125 mils to the preceding total 116, up to 133 mils?—I do, unquestionably; it would require a higher amount of education in that class who do not receive education to enable them thoroughly to understand the mil system.

170. I think I gather from the general tone of your evidence, that you are not prepared to recommend an attempt to exchange our present system of coinage for the decimal system?—It is so.

171. But you are of opinion that if the decimal system of coinage is introduced it should not be founded upon the pound as the main integer of account?—Yes; that is so.

172. You are also of opinion that the attempt to introduce the decimal system of coinage, unless accompanied by a corresponding decimal system of weights and measures, would be highly inexpedient, and lead to inconvenience and confusion?—That is my opinion.

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173. (*Mr. Hubbard.*) Are the Commissioners to understand you to say, that if the tenpenny were adopted as the unit you would adopt also some higher gold unit?—I would withdraw our present pound; I would have a coin representing 25 tenpennies.

174. You would substitute, as the highest unit of one pound, a coin of the value of £1. 0. 10. of the present currency?—I would.

175. Then, in regard to accounts, would you introduce that new highest unit into accounts?—No.

176. You would reduce all accounts to the tenpenny?—Yes.

177. So that the National Debt would not be 800,000,000*l.* sterling; it would be equivalent to so many tenpennies?—Yes. The calculations of the country require people so seldom to refer to the National Debt in their general business that it would not be felt in those large accounts as any inconvenience. That is the exceptional case; not the rule.

178. Setting aside the National Debt, will not this inconvenience result, that whenever now sums are expressed only in pounds sterling, the expression of those sums would be considerably increased?—If only in pounds sterling they would be undoubtedly increased, but in pounds sterling only. That is likewise an exception; the pounds are generally followed by shillings and pence.

179. You recollect that contracts, settlements, foreign engagements, and foreign loans, generally require the expression only of pounds sterling. In every one of those instances the expression of those engagements would be considerably lengthened, and by their being lengthened there would be a greater liability to confusion and error?—A gold coin of 25 tenpennies might be made to answer in the place of the pound.

180. But you have already agreed to except that from matters of account?—Yes.

181. Therefore contracts would not be expressed in that coin, but in tenpennies?—Yes; or they might be contracted in gold coin representing 100 tenpennies.

182. For convenience sake, you would be driven to re-adopt a higher unit than the tenpenny?—The tenpenny itself would become the unit of a gold coin higher. I would adopt a higher unit. I see no objection to that; but I would have the tenpenny for money account. I think it would be a great convenience to pay large quantities of gold in higher pieces than we have at present.

183. (*Chairman.*) Will you be so kind as to state what would be the new coins that would be required in gold, silver, and copper?—I would recommend a four-guinea piece, being equal to 100 tenpennies; and a two-guinea piece, being equal to 50 tenpennies; a one-guinea piece, being equal to 25 tenpennies; a half-guinea piece, being equal to 12½ tenpennies, a 20-franc piece, being equal to 20 tenpennies, and a 10-franc piece, being equal to 10 tenpennies. Those I would recommend as the new gold coins. With regard to silver coins, I should recommend a piece of five francs, being equal to five tenpennies, a one-franc piece, and a half-franc piece.

184. Those would be all new coins?—Yes.

185. How many old coins in the adoption of the tenpenny system of decimals would be abandoned? Those marked with a star in the table at page 56, viz., the sovereign, the half-sovereign, the crown, the florin, the shilling, the sixpence, and the threepenny piece, are to be abandoned, are they not?—I should recommend that those should be called in; but the tenpenny would comprehend the whole of those.

186. Then that would involve practically the substitution of the whole of the new coins which you have stated, and the withdrawal of the old ones?—Precisely.

187. (*Lord Overstone.*) I presume you would leave the old coins to be withdrawn by the sense of public convenience?—Yes; they would get speedily so much worn.

188-9. Public convenience would drop the use of them?—Yes.

The following Table was handed in:

NEW COINS.				OLD COINS.			
Gold	4-Guinea Piece	= 100	Tenpennies.	Gold	*1 Sovereign	= 24	Tenpennies.
	2 „	= 50	„		*½ „	= 12	„
	1 „	= 25	„		*¼ do. or Crown	= 6	„
	½ „	= 12.50	„		⅕ do. or ½ Crown	= 3	„
	20 Franc	= 20.	„	Silver	*1 Florin	= 2.40	„
	10 „	= 10.	„		*1 Shilling	= 1.20	„
Silver†	5 „	= 5.	„		*1 Sixpence	= .60	„
	1 „	= 1.	„		1 Fourpenny	= .40	„
	½ „	= .50	„		*1 Threepenny	= .30	„
Copper	1 Cent.	= .01	„	Copper	1 Penny	= .10	„
					1 Halfpenny	= .05	„
					1 Farthing	= .025	„

* Those marked * to be discontinued and called in.

† These silver coins would immediately harmonize with coins in France, Holland, America, Belgium, Genoa, Geneva, Naples, Rome, Madeira, Turkey, Austria, Frankfort, Spain, Gibraltar, and Sicily,—in many instances, *precisely*,—in others, by a near approximation.

190. (*Chairman.*) In the new coins that you propose I observe a 10-franc and a 20-franc gold coin; take the 10-franc piece; have you not given the Commissioners a calculation here from the observations made in Lord Auckland's time of the more rapid loss by abrasion of the smaller gold coins?—I have.

191. Would not it be an inconvenience to the public (I mean to the holders of coin), so long as the present system prevails, to throw the loss upon them?—I think so; the smaller the gold coin the greater the abrasion, because the two sides of a half-sovereign are much larger than the single side of a sovereign; there is a larger space to be wrought upon.

192. Are you acquainted with Jefferson's notes on the coinage of the United States?—I have seen it, but I am not particularly acquainted with it.

193. There is one extract from it which I think you refer to, and I will read it over to you:—"The most easy ratio of multiplication and division is that of ten. Every one knows "the facility of decimal arithmetic. Every one remembers that when learning money "arithmetic he used to be puzzled in adding the farthings, taking out the the fours, and "carrying them on; adding the pence, taking out the twelves, and carrying them on; "adding the shillings, taking out the twenties, and carrying them on; but when he came "to the pounds, where he had only tens to carry forward, it was easy, and free from error. "Morris (the financier) therefore well proposes that our coins should be in decimal propor-"tions to one another." Do you differ from that statement or not?—I adopt it, because I think he is perfectly right. He says when people are learning. I am supposing that the majority of persons have learnt.

194. Supposing two parties, neither of whom had learnt, to have the two systems proposed to them, do you think that it would be as easy to learn this proposed mode of working out figures as the other?—It stands to reason that there is a greater amount of difficulty given by the compound system than by the decimal system; but speaking from my own practical experience and my own habits, I find no difficulty; and I do not believe that any person accustomed to our mode of calculations finds any difficulty in our present mode of casting up money totals in business.

195. Does it not require rather more attention and care, as being more liable to error in cases in which that attention is not given?—We do it naturally, without thinking of any difficulty; it is a part of the process which is operating in the mind. I can speak only of myself; I experience no difficulty.

196. When we have been talking about the mil system, and supposing it were introduced, do you not consider it highly probable that, as a matter of general convention and convenience that which in France is adopted as a matter of convention and convenience with regard to their centimes would be adopted with respect to mils; that question applying, not to the rectification of existing money amounts, but to future transactions between the buyer and seller?—I think people would naturally adopt that which was easiest, under any circumstances; that I think is to be expected, whatever may be the principle of the decimal coinage.

197. (*Lord Overstone.*) Do you think that it is the primary purpose of coins to facilitate calculations, or that it is their primary purpose to facilitate payment, which must be made in adjusting retail transactions?—I think that all coinage bore reference to buying and selling commodities.

198. Do you not think, therefore, that the principle by which the division of coins should be regulated should be derived from convenience in dividing commodities, rather than convenience in making calculations?—I think so, decidedly.

199. (*Chairman.*) Does not that depend upon the degree to which the dividing of commodities enters necessarily into the operations of buying and selling, as compared with the principle upon which the multiplication of prices enters into the transaction of buying and selling?—We find, I should think, that the great majority of calculations are those made by the poorer classes; and they are all fragments of large quantities; and it is that principle macadamized, so to speak, which is going on amongst the poorer classes, who cannot command a large quantity. They buy the smaller quantities; and I think it is the business of a coinage to be so arranged as to meet the convenience of the poor with reference to those small quantities. I think that was the original intention of coin.

200. Is it not the adoption of a lesser unit for the purposes of convenience?—I think so.

201. Say the purchase of a pound of tea may be a large matter; is the value of an ounce, practically speaking, by the poor buyer, deduced from the specific price of a pound, or does he deal with an ounce of tea as if it was of itself an integer for which he gives a given amount?—He deals with the ounce solely, and not as a part of a pound.

202. (*Lord Overstone.*) You are of opinion, are you not, that coins are instruments for adjusting the retail transactions of the market?—Yes.

203. And that the division of coins ought to be principally regulated with reference to the main consideration of what is the most convenient mode of dividing commodities to be so paid for?—Perfectly so. May I request that the two chapters in my pamphlet, which I think embrace almost everything that I have to say on this question, chapters Nos 10 and 11, be appended to the report of my evidence before the Commissioners?

204. (*Chairman.*) I think it would be a very clear way of putting your views upon the subject.

The following extract from Mr. Slater's Treatise is referred to in his evidence.

Chapter X.

The decimals of one pound will be found on analysis to be "*utterly impracticable*" for monies of account, as well as most inconvenient for ordinary calculations. The whole fallacy on the part of the advocates of that integer rests here, as their theory is founded

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on a *high* integer, which involves the necessity of a *descending* series of decimals, instead of a *low* unit with an *ascending* series of decimals.

This may be exemplified in the single instance of the mint price of gold (3*l.* 17*s.* 10½*d.* per ounce), which, being a price determined by law, may be regarded as a *fixed quantity*, which no system of decimalization of our coinage will be permitted to alter, unless by Act of Parliament. That price is represented by the decimals of 1*l.*, as 3.89375*l.*, while by the *tenpenny* it would simply be expressed by 93.45. The tenpenny unit has here, manifestly, the advantage, *because as it starts from a decimal twice as small as our smallest existing coin, it necessarily comprehends every possible variety of amount by decimals, which is at present demonstrable by the duodecimal system.* Nor is it possible by any arrangement of coinage forming aliquot parts of 1*l.* to get out of this difficulty (so long as it is intended by the advocates of the pound integer to confine monies of account to three decimal places only), or to define results by calculations which must of necessity descend lower than the mil itself (the lowest terms of that theory), no provision being made by their system for expressing a precise result.

The late Mr. James Laurie, in his recently published pamphlet on decimal coinage, has shown, not only by the arguments he uses, but by the tables accompanying them, that the decimals of one pound are wholly inapplicable, either for monies of account or for circulation, and that the wants of the poorer classes, who have a deep interest in this question, as well as the necessities of trade and commerce, require the unit of account to be divisible into a coin of a smaller denomination than the 1000th part of one pound. (Note G.) In practice, our present system enables us, by adopting a minute fraction of one penny, to indicate a value or price far lower than the decimal parts of the pound can express, unless by continuing a series of figures beyond the three decimal places, to which by the mil it is proposed to confine that system. This may be illustrated by the following examples:— By the last advices from New Orleans freights of raw cotton to Liverpool are quoted at $\frac{1}{32}$nds, $\frac{3}{8}$ths, and $\frac{7}{16}$ths of one penny; and the comparative value of these freights in mils of 1*l.* and cents of 10*d.* are as under:—

d.	£	10*d.*
$\frac{1}{32}$	= .0014322916 or $1\frac{8}{19}\frac{3}{24}$ mils	= .034375 or $3\frac{7}{16}$ cents.
$\frac{3}{8}$	= .0015625 „ $1\frac{9}{16}$ „	= .0375 „ $3\frac{3}{4}$ „
$\frac{7}{16}$	= .001822916 „ $1\frac{79}{96}$ „	= .04375 „ $4\frac{3}{8}$ „

In Manchester, gray domestics are quoted as under:—

@$1\frac{7}{16}$	= .005989583 or $5\frac{95}{96}$ mils	= .14375 or $14\frac{3}{8}$ cents.
$1\frac{3}{4}$	= .007291̇6 „ $7\frac{7}{24}$ „	= .175 „ $17\frac{1}{4}$ „
2	= .0083̇ „ $8\frac{1}{3}$ „	= .20 „ 20 „
$2\frac{5}{16}$	= .009635416̇ „ $9\frac{3}{4}\frac{5}{8}\frac{3}{0}$ „	= .23125 „ $23\frac{1}{8}$ „
$3\frac{13}{16}$	= .015885416̇ „ $15\frac{85}{96}$ „	= .38125 „ $38\frac{1}{8}$ „

These, however, are merely comparative results, although it will be seen at a glance how easily the lower decimals of the 10*d.* may be converted into a simple fraction; one most important consideration is the process by which these results are ascertained, and it will be sufficient to exemplify this by a single example; and here it is proper to state that our present duodecimal system, however objectionable for the addition of pounds, shillings, pence, and farthings, is admirably adapted for mental calculations,—that universal system which every invoice clerk understands and must have recourse to, whose business is much concerned in the rapid extension of quantities and prices into their accurate results, but which must be abandoned if decimals are introduced. By mental arithmetic, calculations, apparently the most difficult, are resolved without even putting pen to paper; indeed

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NOTE (G.)

(*Extracts from* "PRACTICAL ANALYSIS OF THE COMPARATIVE MERITS OF £1 and 10*d.* AS THE RULING INTEGER FOR "A DECIMAL CURRENCY. By James Laurie.")

"Again, the vast stimulus which improved machinery, or the application of machinery, has given to productive "labour, during the last twenty years especially, has not only lessened the cost of a variety of articles, but has actually "so far reduced their value compared with a former period as to compel manufacturers to sell the goods in parcels or "fixed lots (usually corresponding to the aliquot parts of a pound or a shilling, for the convenience of calculation), "their minute value making it otherwise impossible to affix a price demonstrable by any even of our smallest coins. "For instance,

"*Pearl shirt buttons* are sold as low as 2½*d.* per gross, or $14\frac{4}{25}$ for a farthing.
"*Agate or porcelain shirt buttons*, at 13½*d.* per great gross, or 32 for one farthing.
"*Bone buttons*, at 10½*d.* per great gross, or 41⅓ for a farthing.
"*Tapes*, at 1½*d.* for 12 pieces, measuring 2½ yards each, being 5 yards for a farthing.
"*Cotton bobbins*, at 1½*d.* for 12 pieces of 3 yards, or 6 yards for a farthing.
"*Sewing cotton on reels*, at 2*d.* per dozen, being equal to 1½ reels for a farthing.
"*Sewing cotton in balls*, at 1*s.* per lb. of 128 balls, being equal to $2\frac{6}{10}\frac{6}{0}$ balls for a farthing.
"*Needles*, 9*d.* per thousand (in 40 papers containing 25 each), being 27½ needles for a farthing.
"*Pins*, at 10*d.* per lb. of 16 ounces, put up in papers of ounces or half ounces, or about 40 pins for one farthing.

"With facts before us such as these, and which refer to only a few of the very numerous articles at the command "of the public, in their constant traffic, it requires no arguments to establish the great truth, *that our coinage as it "stands does not descend low enough for the wants of the great bulk of the community;* and for this evil the proposed "decimal coinage, consisting of pounds, florins, cents, and mils, supplies no remedy, and leaves that important consi- "deration altogether untouched. There can be no question that under the existing system of coinage for circulation "the public is exposed to much loss, either by buying a larger quantity of a commodity than occasion requires, or "submitting to pay a much higher price than any reasonable profit on the original cost of an article would "justify." * * * * * *

never, by an experienced clerk, are such aids had recourse to, unless in the instance of large or intricate quantities or prices. That process is extremely simple, and is founded on the principle of reducing or dividing by 12 or 20, as may be most convenient to the operator, any given *quantity*, while its *price* is increased in the same proportion, so that every *dozen* of articles counts *one;* while, if the price be one *penny*, it is in the same proportion taken as one shilling; thus by *mental* arithmetic,—

$$\frac{3612 \text{ yards}}{\text{at } 3\frac{3}{16}d.} = \frac{301}{3/2\frac{1}{4}} = \frac{25}{38/3} + 1 \text{ at } 3/2\frac{1}{4} \qquad \text{at } 38/3 \quad £47\ 16\ 3$$
$$0\ 3\ 2\frac{1}{4}$$
$$47\ 19\ 5\frac{1}{4}$$

By the simple rule.

3612
$3\frac{3}{16}$

10836
$\frac{8}{16} = \frac{1}{8}$ $451\frac{1}{2}$
$\frac{1}{16}$ $225\frac{3}{4}$

12)$11513\frac{1}{4}$

20)$95.9.5\frac{1}{4}$

$47.19.5\frac{1}{4}$

By the decimals of *tenpence*, as under.

$3\frac{3}{16} = .31875$
3612

63750
31875
191250
95625

1151.32500 =
£47 19 $5\frac{1}{4}$

By decimals of 1*l.*, as under.

3612 yards at $3\frac{3}{16}d.$
$3\frac{3}{16} = .01328125$
3612

2656250
1328125
7968750
3984375

47.97187500 =
£47 19 $5\frac{1}{4}$

N.B.—In both these cases a laborious process must be first undertaken to ascertain the decimal corresponding to the price.

If, instead of a whole number, we were to take a broken quantity, such as $3612\frac{3}{8}$ yards at $3\frac{3}{16}d.$, it will be found that the additional $\frac{3}{8}$ths increases the labour of calculation to an enormous extent.

But it is unnecessary to continue examples like these, which are of constant occurrence in the innumerable ramifications of trade, to convince any practical arithmetician that the decimals of 1*l.*, although pronounced to be the only system adapted for the wants of the country, *is utterly and altogether impracticable for the ordinary purposes of business.* It must be evident to all who are accustomed to calculations, involving broken or fractional quantities at minute prices, that a system which requires so enormous an amount of labour to obtain even an ordinary result is not adapted for the commercial wants of a country like this; indeed, the whole trade of the country would be grievously interrupted were it possible to inflict upon the people so elaborate a system. In support of this position we need only appeal to the common rules of arithmetic as well as to common sense. It is no answer to say that a *mil* is as capable of fractional subdivision as a penny, because, not only is there no provision made by the millesimal theory for carrying into account a denominational value lower than the *mil* itself, but for want of that duodecimal quality possessed by our existing coinage *the decimals of a pound are incapable of being reduced to a vulgar fraction, with denominators admitting of simple notation.*

In the decimal calculation immediately before us, it is seen that an operation comprehending upwards of 100 figures in its entire process is required to produce a result in ten figures, five of which can only be represented in the ledger, according to the proposed theory of the decimals of £1., while the remaining five figures must be dropped as wholly unnecessary. *Indeed, so small a numerical quantity as one eighth of our present penny could not be shown at all,* leaving lower denominations of value out of the question. And although their approximates, if not their equivalents, could be obtained by a lower decimal, there would, in the "*mil*" system be no place to specify the result. By our present duodecimal, or rather mixed system, we possess advantages in the simplicity of calculations, and the ease with which such calculations are performed, from mixed numbers, forming aliquot parts of the coinage, which a merely decimal system, with a large integer, could not confer. This will be at once seen, if we look at the properties of the numbers 10 and 12, the former of which is divisible by only *two* whole numbers, 2 and 5, without a remainder, while the latter is divisible by *four* whole numbers, 2, 3, 4, and 6; but if we increase these numbers in the same proportion, *i.e.* to 100 and 120, we find that while 100 is divisible only by 2, 4, 5, and 10, 120 is divisible by 2, 3, 4, 5, 6, 8, 10, and 12, the one being capable of division by four numerals only, while the other is divisible by eight, without any remainder. For the purposes of calculation, therefore, it is self-evident that a thing divisible into twelve parts contains a larger number of aliquot fragments than a thing divided into ten parts; but when it is considered that these twelve parts (or other binary division) are like the foldings of a sheet of paper, formed into halves, quarters, eights, twelfths, &c., all in harmony with the coinage, it follows that they are more easily adapted to calculations of aggregate amounts than quantities of small value and large volume can by possibility be under a decimal system.

But it is not in calculations only that we have to condemn the pound as an integer for our coinage on a decimal principle. We unhesitatingly deny to it that advantage which the advocates of that theory would ascribe to it, as a medium for keeping accounts. In copying the following twenty totals, consecutively entered in and copied from a mercantile book of accounts, and in converting these totals into the decimals of 1*l.* and 10*d.* respec-

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tively, we shall be able to judge how far the title of a *"labour-saving machine"* can with any degree of consistency be attributed to the higher decimal.*

£	s.	d.	Decimals of 1*l.*	Decimals of 10*d.*
124	15	0	124.750	2994.
148	0	11	148.04583	3553.1
25	2	9	25.1375	603.3
121	12	8	121.633	2919.2
133	3	0	133.150	3195.6
702	13	2	702.6583	16863.8
78	17	10	78.8916	1893.4
31	18	1	31.90416	765.7
60	3	9	60.1875	1444.5
39	16	8	39.833	956.0
15	1	5	15.07083	361.7
39	8	2	39.4083	945.8
28	2	2	28.1083	674.6
20	13	11	20.69583	496.7
19	8	11	19.44583	466.7
23	18	7	23.92916	574.3
48	7	10	48.3916	1161.4
32	1	5	32.07083	769.7
29	2	7	29.12916	699.1
1,722	8	10	1722.4416	41338.6

An analysis of these twenty totals shows that by our *present* system, they require 101 figures to denote them,—by the *decimal* theory with 1*l.* as the unit they will require 132 figures; while by the *tenpenny* theory they will be represented by 89 figures only. If, however, the milesimal system were introduced, and that not more than *three* places of decimals were used, *at the expense of precision in amount*, the number of figures would be reduced to 107, while $7\frac{1}{3}$ mils would be lost in the amount of the total.

In posting accounts into the ledger, the practice is universal to omit the fractions of a penny. It is scarcely saying too much when we state, that there is no banker, merchant, or trader of the least importance who either pays or receives them; and it is more than probable that the same rule may be continued in accounts were the tenpenny adopted as the unit of the coinage, because the second decimal place represents tenths of one penny only.†

* That the decimal of 1*l.* would largely increase labour has been unanswerably established by Mr. Minasi, in an elaborate calculation made by him of the number of figures required to express in the three systems every amount between one penny and one million of pounds inclusive, the results of which are published in the *Society of Arts Journal*, for 5th October 1855, and with his permission are printed in the Appendix (H).

† It may save trouble to those who may hereafter be seeking for equivalents between the relative values of pence and fractions of a penny, compared with decimals of 1*l.* and 10*d.*, that we should here supply them:—

£ s. d.	Decimals of 1*l.*	Decimals of 10*d.*
12 Pence.	.05	1.2
11 do.	.04583	1.1
10 do.	.0416	1.0
9 do.	.0375	.9
8 do.	.03	.8
7 do.	.02916	.7
6 do.	.025	.6
5 do.	.02083	.5
4 do.	.016	.4
3 do.	.0125	.3
2 do.	.0083	.2
1 do.	.09416	.1
$\frac{1}{2}$ or halfpenny.	.0C2083	.05
$\frac{1}{4}$ or farthing.	.0010416	.025
$\frac{1}{8}$	.00052083	.0125
$\frac{1}{16}$	.000260416	.00625
$\frac{5}{16}$	.00078125	.01875
$\frac{7}{16}$	.001302083	.03125
$\frac{6}{16}$ or $\frac{3}{8}d.$	.0015625	.0375
$\frac{7}{16}$	.001822916	.04375
$\frac{9}{16}$	.00234375	.05625
$\frac{10}{16}$ or $\frac{5}{8}d.$	.00260416	.0625
$\frac{11}{16}$	.002864580	.06875
$\frac{12}{16}$ or $\frac{6}{8}$ or $\frac{3}{4}d.$	.003125	.075
$\frac{13}{16}$	.003385416	.08125
$\frac{14}{16}$ or $\frac{7}{8}d.$	.00364583	.0875
$\frac{15}{16}$	.00390625	.09375

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This would effect a saving alone of one figure in every line posted in the ledger, which comprehended cents of the unit. But it would be out of the question to adopt such a rule in the instance of mils, much less to strike off the figures after the first decimal place, where the pound is the integer; because, while the first figure to the right of the point represents *two shillings*, the second can never be less than $2\frac{4}{10}d.$, while it *may* amount to $21\frac{6}{10}d.$ in value; even the *third* decimal place will be as often above the value of one penny as below it. One decimal place, therefore, may be all that is considered necessary in the case of the tenpenny, *while the whole of three decimal places must be used in the instance of the pound, and even then without producing an exact result.* In small amounts, this is exemplified in a striking manner; for example—

£	s.	d.	£	10d.
1	13	5	1.670 83	40.1
1	16	7	1.829 16	43.9
3	9	10	3.491 66	83.8
5	12	9	5.637 50	135.3
12	12	7	12.629 15	303.1

No. of figures, 21. { 21, exclusive of fractions / 31, including fractions } 17 precisely.

The tenpenny unit possesses this peculiar advantage in book-keeping, that if the fractions of a penny are omitted in the ledger, as at present, every sum under 4*l.* 3*s.* 4*d.* (or 1000 pence) is expressed *in three figures only;* the fractions of a penny themselves only add *one* figure more, as we see in the example of the fixed price of standard gold, 3*l.* 17*s* $10\frac{1}{2}d.$ = 93·45, but which, if 3*l.* 17*s.* 10*d.*, would be only 93.4, *being three figures only.*

A great outcry is raised against tenpence as the unit, on the ground that it would lead to the discontinuance of gold coin, and occasion enormous labour to the Bank of England, as well as other Banks, by compelling them to pay and receive everything in *tenpennies instead of sovereigns! ! !* This is certainly a most gratuitous assumption; because, a new tenpenny piece, if adopted as the integer of accounts, would displace no coin whatever at present in use, while it would afford an additional division of the pound by 24 as well as by 20; and we can see no good reason why, if there is a gold coin for 20 shillings, there should not also be one for 20 tenpennies. In France, where gold is not the standard of value, gold pieces circulate as low as five francs.

We have already shown that the decimals of a pound are wholly impracticable for such arithmetical operations as involve precision and rapidity in calculation. On that point, therefore, the advocates of the pound as the integer of the coinage ought at once to join issue, in order to confute that position if it be a false one; but if they fail in doing so it becomes a mere work of supererogation to persist in advocating the pound as such integer, while there is nothing to prevent its continuance in circulation as a multiple of the unit. The entire question rests here. A modification of the same theory, namely, that a florin or two-shilling piece be adopted as the unit, is open to precisely the same objections as the pound, except that it requires only two places of decimals instead of three. In a decimal point of view, neither the pound nor the florin harmonizes with any existing coin under sixpence; and the florin is obnoxious to the same objection with reference to the gold standard as is urged against the tenpenny, namely, that it introduces a silver unit of account instead of a gold one. Now this difficulty is readily met by introducing gold coins of 5, 10, $12\frac{1}{2}$, 20, 50, or even 100 tenpennies, which from their convenience, and applicability to matters of account, would speedily displace the sovereign. The pound itself, except from its traditional importance, has no especial claim to be considered as an everlasting unit in this country, if the convenience of the people demand one that is better. Indeed, its very existence as a gold coin was not known before 1816, and our gold standard existed long before it was introduced. To persist in the pound, as a *decimal* integer, is therefore only a vexatious mode of disturbing our currency, doing no good to ourselves, and affecting no approximation to the coinage or exchanges of other countries, as we should remain simply "*the same, with a difference,*" but a difference attended with very serious consequences.

On the other hand, were the tenpenny unit introduced, our gold coinage could itself be advantageously extended, and every coin with reference to that unit would be thus represented, while the closeness in value of the new gold coins to the guinea and half-guinea of former and only recent times, might justify the same names being applied to them, viz.:

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NEW COINS.				OLD COINS.			
Gold	4-Guinea Piece	= 100	Tenpennies.	Gold	*1 Sovereign	= 24	Tenpennies.
	2 „	= 50	„		*½ „	= 12	„
	1 „	= 25	„	Silver	*¼ do. or crown	= 6.	„
	½ „	= 12.50	„		⅛ do. or ½ cwn	= 3.	„
†Silver	20 Franc	= 20.	„		*1 Florin	= 2.40	„
	10 „	= 10.	„		*1 Shilling	= 1.20	„
	5 „	= 5.	„		*1 Sixpence	= .60	„
	1 „	= 1.	„		1 Fourpenny	= .40	„
	½ „	= .50	„		*1 Threepenny	= .30	„
	1 Dol.	= 5.	„	Copper	1 Penny	= .10	„
Copper	1 Cent.	= .01	„		1 Halfpenny	= .05	„
					1 Farthing	= .025	„

The fraction, under these coins, beyond the second decimal places, will be readily supplied by ¾, ½, or ¼, if the termination happens to be 75, 50, or 25, but none of the decimals will descend to a lower denomination. In such case, common consent will introduce the 10th or 100th of one cent. (as is the case at present in the instance of 8th, 16th, or 32d) for minute calculations; a precision not unlikely to exist in the invoice, but which would altogether be dropped in the ledger.

However objectionable the *pound* may be, as the integer of a decimal coinage, arising almost entirely from its excessive value, there are many reasons which would render the introduction of a decimal coinage and a decimal system of keeping accounts, a matter of great public convenience, particularly where the integer, as in the case of a *tenpenny* coin, would be so small as to be more readily applicable to the value of general commodities, and to the coinage of other countries. This will be clearly seen in the case of foreign exchanges.

The extensive character of our intercourse with foreign countries renders it necessary that we should compare our existing mode of converting values from sterling into foreign monies, or *vice versâ*. We, therefore, take from *Lloyd's List* indiscriminately the course of exchange as it stood at 5th February last.

We there find, that although the rates in the majority of instances are quoted in foreign monies of a variable amount, and compared with the fixed sum of 1*l.* (which is, however, an anomaly, as persons buying or selling generally value the fluctuating worth of an object by the money of their own country), there are some instances in which the quotations are made in pence, thus:—

St. Petersburg is quoted	35d.	rising	⅛d.
Madrid - -	49¾	„	⅛
Naples - -	43⅝	„	⅛
Palermo, &c., &c. -	130¼	„	¼

Let us look at these quotations with advances, and compare them with the decimals of 1*l.* and 10*d.* respectively:—

		Decimals of £.	Decimals of Xd.
St. Petersburg -	35	— 0.14583	— 3.50
	35⅛	— 0.14635083	— 3.5125 or 3.5⅛
	35¼	— 0.146875	— 3.525 „ 3.5¼
	35⅜	— 0.14739583	— 3.5375 „ 3.5⅜
Madrid - -	49¾	— 0.2072916	— 4.975 „ 4.9¾
	49⅞	— 0.2078125	— 4.9875 „ 4.9⅞
	50	— 0.2083	— 5.
	50⅛	— 0.20885416	— 5.0125 „ 5.0⅛
Naples - -	43⅝	— 0.18177083	— 4.3625 „ 4.3⅝
	43¾	— 0.1822916	— 4.375 „ 4.3¾
	43⅞	— 0.1828125	— 4.3875 „ 4.3⅞
	44	— 0.183	— 4.40
Palermo - -	130¼	— 0.5427083	— 13.025 „ 13.0¼
	130½	— 0.54375	— 13.05 „ 13.0½
	130¾	— 0.5447916	— 13.075 „ 13.0¾
	131	— 0.54583	— 13.10

* Those marked * to be discontinued and called in.

† These silver coins would immediately harmonise with coins in France, Holland, America, Belgium, Genoa, Geneva, Naples, Rome, Madeira, Turkey, Austria, Frankfort, Spain, Gibraltar, and Sicily,—in many instances, *precisely*,—in others, by a near approximation.

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The adoption of the tenpenny unit would afford the opportunity of revising the present mode of quoting exchanges, and of our adopting the mode in use in almost every other country of importance, and which is undoubtedly the most natural, by deciding upon a fixed *valuta* in foreign coins, to be valued by a variable *valuta* in British money, as is shown in the subjoined table:—

London Course of Exchange, 11th September 1855.

Amsterdam	11.18	Guilders and Stivers per £
Antwerp	25.37½	Francs and Centimes „
Hambro'	13.8¼	Marks Bco. and Schellings „
Paris	25.40	Francs and Centimes „
Frankfort-on-the-Maine	118⅜	Florins, per 10*l.*
St. Petersburg	35⅜	Pence per Rouble
Berlin	6.21½	Thalers and S. gros. per £
Vienna	11.23	Florins and Kreuzers „
Madrid	49⅞	Pence per Dollar
Leghorn	29.95	Lire and Centimes per £
Genoa	25.45	„ „ „
Naples	44⅛	Pence per Ducat
Palermo	132	„ per Onza
Lisbon	53	„ per Milreis

In place of which the tenpenny would enable the quotations to be made:—

	Xdys.			The Exchange rising or falling.	
Amsterdam	201.50	for 100	Guilders	25	cts. of xdy
Antwerp	94.60	„	Francs	5	„
Hambro'	177.75	„	Mark Bco.	25	„
Paris	94.50	„	Francs	5	„
Frankfort-on-the-Maine	202.75	„	Florins	25	„
St. Petersburg	354.	„	Roubles	100	„
Berlin	357.	„	Thalers	100	„
Vienna	210.75	„	Florins	25	„
Madrid	499.	„	Dollars	100	„
Leghorn	80.15	„	Lire	5	„
Genoa	94.30	„	Ditto	5	„
Naples	441.	„	Ducats	100	„
Palermo	1320.	„	Onza	250	„
Lisbon	530.	„	Milreis	100	„

* These quotations do not profess to be the *exact* equivalents of the exchanges above quoted, but are approximate, and show that the xdy. admits of even smaller advances than the existing system.

Mr. Slater desires to hand in the following copies of *actual*, not fictitious, transactions, with the view of illustrating the practical operation of the three different systems of monies under the consideration of the Royal Commissioners, viz.:—Copies of two separate invoices of goods sold, and of the balance sheet of the United Kingdom as it stood on 31st December last, calculated in *pounds, shillings, and pence*, in *pounds and mils*, and in *tenpennies and cents*. In the number of figures employed in the balance sheet, which comprehends large totals, there seems very little difference in either of these systems, but in the instance of the invoices, particularly where the prices quoted happen to be above the value of one shilling, the disadvantage of the pound and mil system is strikingly apparent, not only from the greater number of figures employed, but in the enormous labour required to arrive at the money amount, corresponding to each quantity and price. These invoices would also establish the fact, that our present compound system is much superior to a decimal system, from the greater facilities it affords, and the time it saves in the extension of commodities into their respective money values, *by means of mental calculation alone*, while the same quantities and prices by the pound and mil system involve an elaborate process to obtain a result which is altogether impracticable by mental calculation.

Mr. R. Slater

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No. 1.

Day Book, H. 212.

Copy Invoice of Goods sold on 8th May 1856.

—		Xdy.			£ s. d.				£ and mil.		
		Price.			Price.				Price.		
	46 × 4 , 46¾										
	60 , 60¾ × 3										
	473 Yards Bob. Net. - -	2 11/16	127	1¼	2 11/16	5	5	11¼	/11⅛	5	262
	44 , 40=84 Black - -	2¾	23	1	2¾		19	3	/11½		966
	41¼ × 8 , 39¼=369¼ White Mechlin	2 3/16	80	7¾	2 3/16	3	7	3¾	/9⅛	3	369
68	42 , 50 × 4										
	51½ × 6										
	52½ × 4										
	55 × 4										
	57½ × 5										
	61 × 2										
	64½ × 3										
	1584 Black - -	1¾	277	2	1¾	11	11		/7¼	11	484
	36 × 3=108 „ Lace - -	4¼	45	9	4¼	1	18	3	/17¾	1	917
2780	12 - - - - - -	4⅝	5	5½	4⅝		4	7½	/19¼		231
2516	13 - - - - - -	5¾	7	4¾	5¾		6	2¾	/24		312
2481	12										
2090	12 } =24 - - - - - -	5¾	13	8	5¾		11	6	/24		576
2196	18 - - - - - -	8	14	4	8		12		/33⅜		601
2022	3 × 48 , 1¼ =145¼ Doz. Cotton Lace -	4½	65	3½	4½	2	14	5½	/18¾	2	723
2023	3 × 45 , 1 5/12=136 5/12 - -	5¾	78	4¼	5¾	3	5	4¼	/24	3	274
39	10 × 5=50 Queen's Blond Quilting	5¼	26	2½	5¼	1	1	10½	/21⅞	1	094
	5 × 43										
	5 2/12 × 3										
	5 3/12 × 2										
	5 4/12 , 5 1/12 × 3										
	266 8/12 Edge Blond Quilting	8⅜	223	3¼	8⅜	9	6	1¼	/34⅞	9	300
2	5 × 8=40 - - - -	10¾	43		10¾	1	15	10	/44¾	1	790
			1031	6¾		42	19	8¾		42	899
	Equivalents in £ s. d. - -		£42	19 8¾						£42	17 11¾

Number of Figures.	Price.	Proceeds.	Total.
By Xdy. process - -	44	65	109
„ £ s. d. „ - -	44	69	113
„ £ and mil „ - -	48	57	105

No. 2.

Day Book, H. 228.

Copy Invoice of Goods sold on 20th May 1856.

Mr. R. Slater.

7th May 1856.

—	——	Xdy.			£ s. d.				£ and mils.		
		Price.			Price.				Price.		
871	24¾ Yds. Moire Silk - -	6.6	163	3½	5/6	6	16	1½	/275	6	806
9028	25 - - - -	9.–	225		7/6	9	7	6	/375	9	375
3028	81 Radzimere - -	4.4	356	4	3/8	14	17		/18 3	14	823
9323	97 - - - -	5.–	485		4/2	20	4	2	/208	20	176
692	32 Velvet - - -	7.8	249	6	6/6	10	8		/325	10	400
8404	35 - - - -	10.5	367	5	8/9	15	6	8	/438	15	330
15706	32¾ Perle - -	5.1	167	¼	4/3	6	19	2¼	/213	6	976
4619	12										
3761	10										
3716	25¼										
3721	17¼										
4711	13										
4910	7										
4900	16¾										
	101¼ Imperial - - -	2.8½	288	5½	2/4½	12		5½	/118¾	12	023
	30 Ps. 24*d.* Oriental Lutes -	21.5	645		17/11	26	17	6	/896	26	880
	108 No. 1. Satin - -	2.1	226	8	/21	9	9		/87½	9	450
	180 1½ - - -	2.9	522		2/5	21	15		/121	21	780
	48 7 - - -	11.6	556	8	9/8	23	4		/483	23	184
	169 1 Simoline - -	1.2	202	8	/12	8	9		/50	8	450
	164 1¼ - - -	1.6½	270	6	/16½	11	5	6	/68¾	11	275
	6 16 Lute - - -	42.9	257	4	35/9	10	14	6	1/788	10	728
	8 × 10 , 6¼ / 7 × 2 , 7½ and 10 } =117¾ yds. stamped satin.	2.6	306	1½	2/2	12	15	1½	/108	12	717
	Box - -		3	6			3				150
			5293	5¾		220	11	3¾		220	523
	Equivalents in £ s. d. - -		£220	11 3¾						£220	10 5½

Number of Figures.	Price.	Proceeds.	Total.
By Xdy. process - -	38	76	114
„ £ s. d. „ - -	39	76	115
„ £ and mil „ - -	52	84	136

Balance Sheet of the United Kingdom on 1st January 1856.

INCOME.

	Xdy.	£ and mils.	£ s. d.
Customs	503,706,057.3	20,987,752.388	20,987,752 7 9
Excise	393,347,667.6	16,389,486.150	16,389,486 3
Stamps	163,334,517.6	6,805,604.900	6,805,604 18
Taxes (Land and Assessed)	70,698,820.9	2,945,784.204	2,945,784 4 1
Property Tax	329,236,446.2	13,718,185.258	13,718,185 5 2
Post Office	27,293,266.1	1,137,219.421	1,137,219 8 5
Crown Lands	6,732,378.9	280,515.787	280,515 15 9
Produce of Old Stores, &c.	12,531,323.5	522,138.479	522,138 9 7
Received from East India Company	1,440,000.	60,000.	60,000
Miscellaneous Receipts	9,666,454.6	402,768.942	402,768 18 10
Unclaimed Dividends received	2,763,590.5	115,149.604	115,149 12 1
	1,520,750,523.2	63,364,605.133	63,364,605 2 8
Excess of Expenditure	507,388,401.7	21,141,183.404	21,141,183 8 1
	2,028,138,924.9	84,505,788.537	84,505,788 10 9

EXPENDITURE.

	Xdy.	£ and mils.	£ s. d.
Interest and Management of Debt	547,022,261.9	22,792,594.246	22,792,594 4 11
Unclaimed Dividends paid	4,157,780.9	173,240.871	173,240 17 5
Terminable Annuities	92,839,039.1	3,868,293.296	3,868,293 5 11
Interest of Exchequer Bonds 1854	5,208,000.	217,000.	217,000
" " Bills, Supply	13,455,245.7	560,635.238	560,635 4 9
" " " Deficiency	225,270.	9,386.250	9,386 5
" " " Ways and Means	641,992.5	26,749.687	26,749 13 9
	663,549,590.1	27,647,899.588	27,647,899 11 9
Charges on Consolidated Fund.			
Civil List	9,517.680.	396,570.	396,570
Annuities and Pensions	8,183,801.6	340,991.733	340,991 14 8
Salaries and Allowances	3,904,736.7	162,697.362	162,697 7 3
Diplomatic Salaries and Pensions	3,581,872.6	149,244.692	149,244 13 10
Courts of Justice	11,833,990.6	493,082.942	493,082 18 10
Miscellaneous Charges	4,370.851.8	182,118.825	182,118 16 6
	41,392,933.3	1,724,705.554	1,724,705 11 1
Supply Services.			
Army	349,081,416.	14,545,059.	14,545,059
Navy	456,352,992.	19,014,708.	19,014,708
Ordnance	231,174,960.1	9,632,290.004	9,632,290 1
Vote of Credit (additional expenses of war)	124,800,000.	5,200,000.	5,200,000
Miscellaneous	161,787,033.4	6,741,126.392	6,741,126 7 10
	1,323,196,401.5	55,133,183.396	55,133,183 7 11
	2,028,138,924.9	84,505,788.538	84,505,788 10 9

Total number of Figures by £ s. d. - - 321
Do. do. „ £ and mils - - 334
Do. do. „ Xdy. - - - 322

Saturday, 10*th May* 1856.

The Lord MONTEAGLE OF BRANDON in the Chair.

Mr. Robert Shaw examined.

Mr. Robert Shaw.

10th May 1856.

205. (*Chairman.*) You reside at Bristol, do you not?—Yes, my Lord, I do.

206. Have you turned your attention to the question generally of numbers as applicable to coinage, and to the particular question of changing our present system of coinage into the decimal system?—Some time ago I did address very particular attention to the subject, and I arrived at this conclusion, that the decimal system would not be so good as that which we now have, and that in all the powers of numbers nothing can be devised at all so good for subdivision of the pound sterling as the numbers 20, 12, and 4.

207. A pamphlet has been under the consideration of the Commissioners, entitled "Rationale of our Present Subdivision of the Pound Sterling, with Strictures on the Decimal Coinage." Is that your work?—It is.

208. What has been your occupation in life?—I am a public accountant.

209. In your avocations as a public accountant did you possess practical means of testing the reasoning upon which you founded the conclusions which you have already stated?—I cannot say, my Lord, that it necessarily grows out of my vocation, but some particular circumstances called my attention to the subject. I conceived that an erroneous opinion was obtaining very great ascendancy, and I thought it not unbecoming to write this pamphlet.

210. In forming that opinion your attention has been directed, has it not, to the Report of the Select Committee of the House of Commons, and the evidence given before them?—I certainly have read that report very attentively.

211. Probably you have read many other publications which have also occupied the attention of the public?—Only a few of them, for they seemed a repetition of the same argument.

212. The Commissioners having this pamphlet before them, perhaps it may save something of your time, and the time of the Commissioners, if I take the liberty of asking you whether in any respects since the publication of this treatise you have seen reason to change the opinions which you have therein expressed, and if you have, will you state in what particulars?—The only change that I perceive is that I have additional reasons to confirm that essay, which, with submission to the Commissioners, I will read:—

First, I am of opinion that in the subdivision of the concrete integer the paramount object is conciseness in expression of quantity; that, for instance, instead of writing or uttering on all occasions 358,400 ounces, we may say at once 10 tons; or, *vice versâ*, instead of $\frac{1}{35840}$ of a ton, we may say 1 ounce (and so of other quantities).

Secondly, I consider this, and not facility in calculation, the *paramount* object: because in all transactions calculation is an operation once performed, and then done with; but the figures produced by that calculation are afterwards copied, perhaps hundreds or thousands of times. For example, an actuary calculates *once* the premium on a life of a certain age; but that premium is copied, I know not how often, whenever a policy on a life of that age is effected, and afterwards every year when the premium is paid. It is not necessary to accumulate examples from other professions or trades.

Thirdly, If we admit that this (conciseness in expression of quantity) is the *paramount* object, then it follows that, having taken some quantity as the integer or highest "denomination" of measure in any substance, we are to express all minor parts of that integer in the fewest words or figures. Now parts of anything are found by division; the perfection then of metrical subdivision is, to recognise, as parts or minor denominations, quantities produced from the integer by the largest possible number of divisors.

Fourthly, With a clear apprehension of this, we must perceive that a proposed system for representing all quantities by simple notation of the minimum quantity recognised is not the best system that can be devised; it is in fact writing, instead of 4 shillings, 192 farthings, and so of other quantities.

Fifthly, Upon a comparison of our present system and a decimal subdivision we find them respectively forming clean quotients, without remainder, from the following divisors, which I will beg to hand in to the Commissioners in a tabular form:—

	£	s.	d.
1*l.* divided by 2	–	10	–
„ „ 3	–	6	8
„ „ 4	–	5	–
„ „ 5	–	4	–
„ „ 6	–	3	4
„ „ 8	–	2	6
„ „ 10	–	2	–
„ „ 12	–	1	8
„ „ 15	–	1	4
„ „ 16	–	1	3
„ „ 20	–	1	–
„ „ 24	–	–	10
„ „ 30	–	–	8
„ „ 32	–	–	$7\frac{1}{2}$
„ „ 40	–	–	6
„ „ 48	–	–	5
„ „ 60	–	–	4
„ „ 64	–	–	$3\frac{3}{4}$
„ „ 80	–	–	3
„ „ 96	–	–	$2\frac{1}{2}$
„ „ 120	–	–	2
„ „ 160	–	–	$1\frac{1}{2}$
„ „ 192	–	–	$1\frac{1}{4}$
„ „ 240	–	–	1
„ „ 320	–	–	$\frac{3}{4}$
„ „ 480	–	–	$\frac{1}{2}$
„ „ 960	–	–	$\frac{1}{4}$

Divisors 27.

Giving quotients—
Of 1 denomination of money - - 16
Of 2 denominations - - - 11
27

	flor.	cents.	mils.
1*l.* divided by 2	5	–	–
„ „ 4	2	5	–
„ „ 5	2	–	–
„ „ 8	1	2	5
„ „ 10	1	–	–
„ „ 20	–	5	–
„ „ 25	–	4	–
„ „ 40	–	2	5
„ „ 50	–	2	–
„ „ 100	–	1	–
„ „ 125	–	–	8
„ „ 200	–	–	5
„ „ 250	–	–	4
„ „ 500	–	–	2
„ „ 1000	–	–	1

Divisors 15.

Giving quotients—
Of 1 denomination of money - - 12
Of 2 denominations - - - 2
Of 3 denominations - - 1
15

The result of this table is that the pound sterling, subdivided into shillings and pence, may be divided by 27 different numbers, giving for 16 of those divisors quotients of only 1 denomination of money, and 11 quotients of 2 denominations of money, there being no

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remainders: but divided into florins, cents, and mils, it will divide only by 15 numbers, 12 of them with quotients of 1 denomination of money, 2 with quotients of 2 denominations of money, and 1 with a quotient of 3 denominations of money. It thus appears not only that our present system is far superior to the decimal plan; but on examination of the divisors, in their number and adaptability to the usual wants of society, it is the best that can be devised.

213. Is that the close of your memorandum?—Yes; that is what I may call *the text.*

214. You have stated the great importance of conciseness of expression, and you have illustrated the inconvenience of the decimal system by the expression of the weight in ounces; I think it was in parts of a ton. Would there be any greater necessity, say, of using a number of mils so expressing the coin or the value of the coin, than there is now of expressing a pound by 960 farthings? Would there be any necessity of expressing a pound by 1,000 mils, and using four figures constituting 1,000, than there is now in expressing a pound by three figures, 960, constituting the number of farthings?—There would be one figure more, if taken simply on that ground.

215. But my question is this:—Unless it be necessary now, by reason of the division of the pound sterling into 960 farthings, to express it by 960 farthings and not £1, how would it be more necessary to express a pound sterling by 1,000 mils, and not by the item £1 sterling? Would not that inconvenience or that disadvantage be common to both systems?—In either way we should state a pound by a figure 1; but, in our consideration as to various parts of a pound, we may be very sure that whatever name is given to those parts of a pound, or whatever proportion they may bear to the whole pound, people will buy exactly the same quantities of the same things, and tradesmen will require exactly the same quantity of silver or copper for them; and our question, if I understand it rightly, is, in what form may those quantities of silver and copper be most conveniently expressed? I believe that in those purchases in shops in which money is paid, probably three out of four consist of the subordinate parts of a shilling, *i.e.* some number of pence. At present we represent all numbers of pence, except 10*d.* and 11*d.*, by one figure. Under the decimal coinage we must use, for a penny the figure 4, and for twopence the figure 8, and for all other numbers of pence two figures where we now use one.

216. Do you not think that the present mode of buying has a reference to the coins in which commodities are to be paid for; and that if a new system of coinage was introduced the market would adjust itself to the new coins, upon the ordinary principles upon which the free exchange of commodities, with unlimited variation in point of price, now adjusts itself to the purchases and sales of articles?—I have no doubt that the same quantity of tea or any other thing would be sold for the same quantity of silver; but I also perceive that the parts of this pound of tea, being supposed to cost the same portion of a shilling, there must be more figures used to represent the value of that which actually changes hands, than there are at present.

217. Does that assume that the quantity sold will continue unaltered? If the party buying is in possession of a coin on Saturday varying from the coin which he had in his hands on the Monday, do you not think that the quantity of the article bought will adapt itself to the Saturday coin, to enable the exchange to take place between the buyer and seller, with as much facility in the one case as in the other?—I do not, and for this reason, that the quantity of goods bought must be measured by some recognized legal weight, and this recognized legal weight will not divide *pari passu* with any decimal subdivision of money, and therefore you will very rarely be able to meet exactly with your new coin the quantity purchased according to the legal and standard weights of the tea, or whatever it is.

218. Then you think that it is the immutability, as it were, the fixity of the weights and measures, that would prevent the adaptation of the quantity purchased and sold to a variation of the denomination of the coin?—Certainly, if our present weights and measures are retained we come to a most perplexing difficulty indeed, because, unless a pound weight of tea, or whatever it is, comes to exactly 8*s.* or some multiple of 8*s.* unless that is the case, you will always have a remainder from it. Suppose the exact value of an ounce to be 3*d.*, 4*d.*, 5*d.*, or any other sum but 6*d.*, you would always have a remainder; that is to say, the quantity purchased will cost so many cents and mils, and a part of a mil, if you retain the pound and the ounce weight.

219. Is there no other way of adjusting the price than that of varying the quantity; is there not also a mode of adjusting the price by varying the quality of the article bought or sold?—There certainly is; and if I mistake not there is at present a Committee actually sitting to inquire into the adulteration of food, and a glorious scope would then be given to those who commit that offence.

220. But independently of any question in our hypothetical case of the adulteration in all the articles of first necessity, especially of those to which you refer as illustrations of your argument, tea and sugar, and produce of that description, is there not, at lesat within certain limits, an infinite variety of qualities, all representing different values, and capable of representing the variations of price, and the variations of coin in which that price is represented, between buyer and seller?—Unless you depart from your pound and ounce weight you can never make it meet exactly, for the reasons which perhaps your Lordship has observed in page 32 of this pamphlet. There are, in that page, 16 prices, which are commonly every day charged for a pound weight of various articles. Those prices are set forth in shillings and pence, and likewise in a supposed decimal coinage. If your Lordships will for a moment look down those decimal figures, you will find that there is not among them one price that will divide by 16, the divisor for an ounce, without leaving a remainder. Only one, the first of them, will divide by 8 or even by 4, and only 4 of them by 2 without

leaving a remainder. The shopkeeper cannot afford in all these cases to lose that remainder, and the poor man or the poor woman must.

221. But the question that was put to you was, how far it was or was not true, taking that scale of your own in page 32, that either by the prices of the articles represented there, or by the mixture of those very articles so as to produce intermediate prices, or proportionate prices, in proportion to the mixture, of a higher or a lower denomination, you had the absolute power of adjusting the price by the variation of the qualities to suit any possible scale of money that could be devised in those limits?—Certainly, that may be done. For instance, we may make something that is now 3½*d.* a mil better in quality, or something else a mil worse in quality, but the mixture of different qualities opens a wide door to adulteration.

222. But, taking that into account, would that increase the power of or the motive for adulteration, and add to those which now exist?—It would, in my opinion; but what is much worse, it would afford, under the sanction of the Legislature, some palliation for what in itself is a heinous crime.

223. If you take into account the variations in price in wholesale commodities, how is that variation of the wholesale price, by the pound we will say, or by the chest of tea, distributed in the retail sale of that tea by the ounce to the poorer classes?—A small variation in the wholesale price must absolutely vanish when you come to the ounce.

224. In that case, if it vanishes altogether, who gets the benefit of it?—It seems to me to be a toss up; sometimes the wholesale vendor, and sometimes the retail dealer.

225. In that case, on that rough principle of adjustment, that sometimes the fraction goes in one way, and sometimes the fraction goes in the other, is not the tendency of the whole, upon the average, to bring the rate of profits of the parties selling to the average rate of profits which can be made in other trades of the same description and the same amount of risk?—Certainly the rate of profit will be that determined by competition; but I cannot perceive how, if there is an arithmetical impossibility in the price so ascertained, it can be made to adjust itself in the purchase of minute quantities. If, for instance, you want to divide the figures 157, the price of 1 lb., by 16, there must be a remainder; then the thing does not adjust itself; and whenever there is a remainder I take it that the shopkeeper will charge it as a whole mil, and the poor man will lose it.

226. In page 7 of your pamphlet you state, "The humbler classes in this country "purchase their supplies of tea, sugar, and other necessaries of life in small quantities, by "the ounce, quarter pound, &c. Now the price of the pound of these articles is fixed "by competition, so that it cannot be more or less, and it is such that with the help of the "farthing the price of the minute quantity required is in almost every case exactly defined." In what respect do you think that the retail prices vary from the prices which you state here, which are fixed by competition, so that they cannot be more or less; why is it that the same principle does not apply to purchases of the smaller articles?—It does apply to the purchases of small articles.

227. The same principle of competition?—Yes.

228. (*Lord Overstone.*) If I understand you correctly, your view is, that competition would regulate the price of articles, both in the gross and in the retail; but that the operation of that principle of competition is necessarily affected or influenced by the state of the coins, inasmuch as the price must be adjusted in coins, and when you come to the smaller retail prices the difficulty arising out of the state of the coins will interfere, and in a greater or less degree modify the great principle which would determine the price of things according to competition?—No; that is not my view. I consider it certain that competition will regulate the shop price at which anything is sold, and that at present our coin meets the small fractional parts of ounces, and so on, without leaving any remainder; but if we have a decimal coinage then the exact equivalent of the price of the pound weight consists of such a figure that you cannot divide it by 16, or generally by 4, without a remainder; that remainder the shopkeeper cannot afford to lose, and the poor man must.

229. If I understand your answer correctly now, it is really a statement of the principle which in my preceding question I wished to set before you, therefore I have failed to make myself understood. If I understand your last answer, it amounts to this, that in the endeavour to adjust the price of the retail quantities under the decimal coinage you would meet with difficulty and obstruction, in consequence of the coins not adjusting themselves to the smaller variations of price, as they do adjust themselves under the existing coinage?—I did not say that they would not adjust themselves to the variations of the price, but they would not adjust themselves to the small quantities required.

230. The price must adjust itself to the small fractional quantities?—That is exactly my meaning, as to the coins paid for the small quantities.

231. (*Chairman.*) Are those inconveniences peculiar to the decimal, or do they not exist under the present system, as, for instance, if I find that an article of which the cost is 23*d.* per pound gives to me per ounce a price of 1½*d.* plus ¾ of ¼*d.*, that an article of 11*d.* per pound gives to me per ounce ½*d.*, plus ¾ of ¼*d.*, and that an article at 7*d.* per pound gives to me per ounce ¼*d.* plus ¾ of ¼*d.*, how are those compound fractions, which are not represented by any given coin whatever, now to be paid by the purchaser of an ounce?—I believe that the poor rarely, if ever, purchase less of an article than is met by a farthing; but if we are to have the operation of what is stated in page 32, in 15 cases in 16, where a poor person goes to buy a small quantity of something that he would now buy for 1½*d.*,

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$1\frac{3}{4}d.$, or such small sums, there would be a remainder, which must be lost either by the tradesman or the purchaser.

232. According to the decimal system?—Certainly.

233. But in the cases that I have put merely as illustrations every one of them is under the present system, and in every one of those cases low-priced articles by the pound cannot be worked out by the ounce by anything but a coin which it is impossible to pay. I want to know how the question of price is adjusted now under those circumstances?—That is a question for people who deal in those articles to decide; but I am informed by persons who have a good deal of purchasing at those shops, that they never saw, in fact, a case in which a poor person came to a huckster's or a grocer's shop in which a farthing did not exactly meet the amount required; in such a case, for instance, as 11*d.* per pound, they would buy 2 ounces instead of 1, or something like that.

234. Would not those facilities likewise of so adjusting the quantity bought apply likewise to the decimal coinage, it being always understood that in using the words "decimal coinage" it is proposed to retain the 6*d.*, the 1*s.*, the half crown, the 2*s.*, the 5*s.*, the 10*s.*, and the 20*s.*, as at present?—On that, my Lord, I may speak with some confidence. If the price of the quantity bought was, in present money, anything below 6*d.*, in the price of that quantity in decimal coinage there would be a remainder.

235. In all cases whatever?—Yes; if the price of the quantity bought was in present value below 6*d.* there would be a remainder.

236. But there being, in the cases which have been put to you of purchases at 23*d.* per pound, 11*d.* per pound, and 7*d.* per pound, a remainder which it is impossible to represent in a coin at present, in what respect would the provision which is now made for the purchase of those articles be inapplicable to the purchase of articles under the decimal system of coinage, there being a remainder in each of those cases?—In the simple fact that the cases which your Lordship states have been selected, and are extremely rare cases, if they ever occur; but in a decimal division of the pound, where the price of the quantity bought is less than 6*d.* of our present coin, there must always be a remainder.

237. Do you think practically that the cases of 23*d.* per pound, 11*d.* per pound, and 7*d.* per pound, which are taken by way of example, are so rare in the transactions of human life?—I do not say that they are rare, but I mean that I think it is a very rare thing to hear of a person wanting an ounce of any article at those prices.

238. In this passage to which I have referred in your book you state, "The price of the "pound of these articles is fixed by competition, so that it cannot be more or less, and it is "such that with the help of the farthing the price of the minute quantity required is in "almost every case exactly defined." Is the farthing much used with respect to the purchases of the poor in tea, sugar, coffee, and in articles of that description to which you have referred?—I am informed that it is. My daughter purchases these things for me, and she informs me that it is.

239. I think you refer with perfect accuracy to the fact that the proposal made to give a more minute subdivision by the actual creation of half farthings was rejected, and not used, and therefore you infer that the farthing is the lowest division that we require?—Just so. I certainly understood so, and firmly believed it, till very lately; but one gentleman, who has taken some pains with the subject, informs me that he knows instances in which the half farthing is required, and if this often occurs I should certainly say have an issue of half farthings. This gentleman informs me that the impediment to the circulation of those half farthings is, that they are only allowed to go from the Mint in, I think, the quantity of 25*l.* to one person. With great submission I would suggest that they be allowed to go from the Mint in such quantities as 5*s.* worth rather than the poor should suffer by the other practice.

240. I think I collect from you now, as well as from your book in page 8, that where a remainder of some portion of a mil takes place, "this portion of a mil the tradesman "cannot afford on every purchase of 1*d.* or 2*d.* in value to lose; he must therefore charge "it as one mil. But to subject for ever the millions of deserving people who form the "humbler classes in this country to loss such as this, a loss of about 1*s.* in 15*s.* of their "scanty means, would be monstrous. The farthing, therefore, of 1·960th of the pound, is "indispensable." Do you consider, even if that loss was assumed to take place, that that loss could by possibility be permanent, as it is here stated?—Arithmetically so. If there is truth in arithmetic I conceive that it must be so, unless indeed the tradesman chooses to increase a little the total price of one article, and diminish a little the total price of another, so as in those transactions to make the price of each article some multiple of 16 mils.

241. Supposing that took place, would it not add four per cent. to the profits of those tradesmen so taking the benefit of the fractional part of a mil?—Yes, upon those transactions.

242. In proportion as it was a loss to the poor, which you value at 1*s.* in 15*s.* of their scanty means, must it not necessarily be so much in addition to the previous profits of the tradesman?—The tradesman has, we suppose, transactions large and small. His large transactions it does not affect; but the sting of it is this, on every twopennyworth or onepennyworth of everything that he sells, where the ounce comes to a halfpenny or 1*d.* or $1\frac{1}{2}d.$, or some such small sum in actual value, there is in a decimal division of money a loss on the average of half a mil to the poor person who buys, and that certainly is gained by the tradesman; the poor would lose after a rate which I estimate at 1*s.* in 15*s.* upon those

purchases, or, upon every 1*d.*, 1½*d.*, or 2*d.*, on the average half a mil. To the tradesman that would be a comparatively small addition to his total gains, because he has much larger transactions in which his gains remain the same as before.

243. But to whatever proportion the price is augmented to the poor in consequence of that cause to which you have referred, must not the price received be augmented to the tradesman?—The price is augmented only in those very small driblets of quantity that he sells to the poor.

244. In whatever proportion, be it great or small, that the price is augmented to the poor, must not the receipt in that same proportion upon that class of transactions be augmented to the tradesman?—It must be augmented only in those minute transactions.

245. Practically speaking, in such a great city as Bristol, and the metropolis of London, are not the shops of hucksters and the chandlers' shops, where the poor chiefly make their purchases, a particular class of shop; are there not large shops and large warehouses in which the transactions of the poor for the most part, though not exclusively, take place?—Perhaps there are. I have not sufficient experience in those matters to say.

246. (*Lord Overstone.*) Have you the means of forming a judgment as to the relative number of transactions with the poor which take place in shops, or which take place in open markets?—None whatever.

247. (*Chairman.*) If the result of inquiry should show that the purchases in the grocers' or what are called chandlers' shops comprehend almost all the dealings of the poor of the kind that we have been talking of, in whatever proportion they are exclusively or generally for the purchases of the poor, would not the supposed profit which you have pointed out as arising out of the fractional parts of the mil raise the profits of that class of tradesmen above the other class of tradesmen in which the transactions were of a larger kind?—It would.

248. Would not the tendency of that immediately be to produce more shops of that description, if it were found that they had a greater profit upon the transactions?—That is a nice question. There might be in a certain town a profit, we will say, for 20 of those shops, but if there were 25 probably they would all starve. But after all, the arithmetical difficulty is incurable. Either the new competitors must sell at a loss, or they must charge the "remainder" as a mil.

249. Is there not a very active competition, for instance, in the poorer parts of every great town, in the sale even of such an article as bread? A halfpenny variation perhaps takes place in the price, either raising or lowering it; and do you not constantly see "cheap bread," and "bread at the old price," or the price marked upon the actual loaf in the baker's window, proving that there is an active competition even in such an article as bread?—Certainly, I see that particularly in bread.

250. (*Lord Overstone.*) The questions which have recently been put to you had reference to this principle; first, that in subdividing into minute quantities the price of an article under the proposed decimal system of coinage you will be driven to the necessity of giving a small turn to the wholesale dealer or to the retail purchaser, and that it cannot be given to the retail purchaser, because in that case a loss would fall in a multiplied form upon the wholesale dealer, which he could not bear; therefore it is inferred that the benefit must fall to the wholesale dealer, but the consequence of that benefit would obviously be an increase in his profits; therefore it would follow that competition will compel that wholesale dealer to resort to the same course by which that increased rate of profit would be brought to its legitimate standard. The difficulty appears to be this, that he could not reduce his price accordingly, in consequence of the difficulty in regard to the smaller coins, and therefore his only mode of bringing his profits to their legitimate level would be an alteration in the quality of his articles. Hence it is inferred that the difficulty already alluded to, arising out of the imperfect divisibility of decimal coins, would rather compel the wholesale tradesman to alter the quality of his article where the coinage would not admit of his altering the price. Do you feel the force and truth of that argument, or do you not?—I perceive exactly the effect of it. It assumes that the purchaser is a very exact judge of the quality of what he buys It leaves a sort of vague uncertainty about it. The improvement of an article to the exact nicety required is, to be sure, possible, but whether that improvement would be discerned and understood by every customer I think is very doubtful.

251. Assuming that a rectification, which could not arise through an alteration of the price, might be brought about by an alteration of the quality, do you consider that it is a recommendation of any proposed scheme for the improvement of the coinage that it involves the necessity, for the sake of rendering that coinage convenient, that the tradesmen should alter the exact qualities of their commodities?—I think, on the contrary, it is leaving an opening for a wide vagueness in transactions. But, with great submission, it is not an improvement of the coinage that is proposed; it is an alteration, which would be attended with most distressing consequences to persons who have much to do with accounts.

252. (*Chairman.*) You referred just now, did you not, to the question of weights and measures?—I did.

253. You have stated the great and leading distinction between coins, and weights and measures, in page 21 of your book where you state, "While money is of cosmopolitan "interest, and is used by all individuals in all nations, weights and measures are instru- "ments technically used by different classes in trade. They are for use, and therefore

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" must be such as best suit the quantities commonly required of the goods sold by those " who use them. In weight the ounce and the pound; in length the inch and the foot, " the yard and the mile; in liquids the pint, the quart, and the gallon; in land measure " the acre and the perch, are quantities so interwoven with the natural wants and " accustomed demands of purchasers, that to prescribe in these articles any other measure- " ment, however scientific, would be to invert legitimate order, and make science the " mistress instead of the handmaid of man." Is it from that supposed necessity of adjusting weights and measures to articles which are sold, that one finds in the markets recognized by law, but still more by custom, such a vast variety of different weights and measures applicable to different things, such as the avoirdupois, the troy, and the apothecaries' weight, the ale and beer measure, the wine measure, the cloth measure, the dry measure, and different kinds of long measure, solid measure, square measure, and all the customary measures; and do you think that that is a proof of the correctness of what you state as to weights and measures specially adjusting themselves to the articles that are to be sold?—I am not *au fait* with the weights and measures question, but a few things have fallen within my observation. A wine merchant told me, that in that business the higher measures of wine were adapted to those of the principal countries from which our wines are imported. I was speaking to a grocer about the decimal division of weights and measures, and he seemed to be absolutely frightened at the idea of it. He stated that the teas from China all came in packages of which 7 is the pivot number, 21, 42, 84, and 112, but 7 is the pivot of all those numbers. In like manner I can suppose that in different trades they have adopted different weights and measures to conform to the quantities in which goods of foreign production are imported. I do not speak from knowledge, but I only guess from those two examples that it is so.

254. The general tendency is that the weights and measures should adapt themselves to the convenience of the parties selling the particular articles to which those weights and measures are applied?—Exactly so.

255. Then, there being a vast variety of weights and measures now existing, is it possible to consider, comparing those different articles with the constant quantities of our coins, that our present subdivision of coins can be in harmony with all those different weights and measures?—Certainly they cannot. If there is any necessity for different subdivisions in different weights and measures, no division of coin can be in harmony with them all.

256. (*Lord Overstone.*) Is it not a striking characteristic of all our varying systems of weights and measures, that they are subject to the binary principle of subdivision?—It appears to me to be an ineradicable system founded in nature and the human mind; and you will never get the generality of people, let them be as highly educated as they choose, to resort by choice to any other than the binary subdivision in their ordinary purchases. It is the most easy form of calculation, and will therefore be preferred by all persons.

257. Is it not the fact that our present system of coinage, and all our varied forms of weights and measures, are eminently subject to the binary system of subdivision to a degree and an extent which would not be applicable to the decimal system of coinage?—Undoubtedly.

258. Does not that then constitute a harmony or an adaptation between our present system of coinage and all our varied forms of weights and measures which would not exist between the decimal system of coinage and our present forms of weights and measures?—Most certainly.

259. (*Chairman.*) Take the ale and beer measure. If you were dealing with three kilderkins or with nine gallons, how would you apply the binary system without fractions?—It is in the purchases of the humbler classes, or rather of the middle and humbler classes, by retail, which form nineteen times in twenty that the scale is used, that the binary division is so prevalent. You will find in retail purchases invariably that the mind vibrates towards the binary subdivision; and in wholesale purchases I take it that the merchant and importer of foreign goods follow the scale of packages or the size of casks that is adopted by the nations with which they deal.

260. You stated, did you not, that it would be impossible to apply to weights and measures the same subdivision, however excellent, which is used in coins?—Certainly; unless by some unwise exercise of power.

261. (*Lord Overstone.*) Next to the binary principle of division, do you consider that the most important with regard to practical convenience is the division into three parts?—I consider that our present system, combining the numbers 2 and 3 and their multiples up to 960, is the very perfection of mathematical science in the subdivision of money. We have the binary division carried up to its fifth power, 64; as twice 2=4, twice 4=8, twice 8=16, twice 16=32, twice 32=64. In the decimal system you cannot carry the binary division further than to its second power, 8. Twice 2=4, twice 4=8, and there it breaks down. That is one great point which has excited my notice. But besides that combination of 2, 3 and 5 up to 960, you have the capabilities of dividing the pound into various parts, having coins so adapted to the various parts, which you could not have under any other combination of numbers whatever.

262. Do you not consider, speaking practically rather than scientifically, that the divisibility into halves and into third parts, both of material things and of coins as instruments for paying for material things so subdivided, is eminently conducive to public requirements and convenience?—Of other things besides money there is such a great variety that I could

hardly venture to apply the same principle to them all. In some cases it might be very desirable, but in others it might not.

263. Do you not think that our varied system of weights and measures is characterised, not without exception, but by a very strong predominant tendency, to facilitate the subdivision into halves and into third parts?—The table of weights and measures which is most frequently used is avoirdupois; there we do not find it so. But in the larger quantities of liquid measure (both wine and beer) and in some others 3 is a pivot number.

264. Do you not, in the avoirdupois weight, find the binary principle strongly developed?—Yes; but not into thirds, certainly.

265. Do you not think that our present system of coinage affords corresponding facilities for division either into halves or into third parts, and much greater facility than could be obtained by any system of decimal coinage?—Undoubtedly. Decimal coinage renders division into three impossible. You must always have a remainder.

266. (*Chairman.*) Can you reconcile with the opinions that you have expressed this passage from Aristotle, that "it seems a law of nature that 10, 100, and 1,000 should be adopted, "otherwise it would be impossible to explain their universality, and this not only among "civilised but amongst uncivilised nations"?—There seems to be no difficulty whatever in reconciling it with every word that I have said. Aristotle, I presume, is speaking there of cumulative quantities, something like our national debt, perhaps. We are speaking of the subdivision of a certain definite quantity into the most convenient parts. Aristotle, when he mounts up to 1,000, is talking of something like our national debt.

267. (*Lord Overstone.*) Are you aware that very high authorities may be quoted for the opinion that we have made a great mistake in adopting the decimal instead of the duodecimal system for our arithmetic?—I am not aware of that.

268. Are you of opinion that it is a clear case that in adopting the decimal rather than the duodecimal process for our arithmetical system we have acted wisely, and in a manner productive of the greatest amount of public good?—Decidedly I think we have; but there I speak of large quantities, cumulative quantities, and not of the subdivision of an integer into parts.

269. But looking at the whole result, remembering that when you adopt an arithmetical system you adopt it necessarily both for the purpose of multiplication and division, and looking at the subject comprehensively in both respects, are you still confidently of opinion that the decimal system is as good as would have been the duodecimal system, had it been adopted instead of the Arabic system?—It is a very deep question, which I have not considered. It seems to me that a duodecimal series, while it expressed large numbers in fewer figures, would require figures (representing 10 and 11) of so much higher power than we now use, that in the work of addition and multiplication the labour would be much increased.

270. (*Chairman.*) You have turned your attention specially, have you not, in your publication, to the present integer of the pound sterling?—Yes.

271. What is your opinion with respect to the expediency or inexpediency of departing from that integer?—That it would be, looking either upwards or downwards, a false step. Looking upwards it would derange all contracts of an enduring and extensive character; but looking downwards, either you must vary the farthing, or you must lose our excellent system of subdivision, 20, 12, and 4. If I may be excused a digression of a minute or two, I would remark, that since this pamphlet of mine was printed some things have come to my knowledge which perhaps are not universally known. It is commonly known that the pound sterling was divided by twenty shillings in the reign of the Conqueror (before that the pound = 12 oz. of silver was divided into 48 shillings, the shilling into 5 pence); in the year 1505 we had the coinage of shillings, in the reign of Henry the Seventh; and William the First and Henry the Seventh were considered wise princes. In the reign of James the First is the first example of the copper coinage of halfpence and farthings, which put out of circulation that inconvenient piece, the silver penny. I have been questioned as to how it came to pass that the Americans, the French, and other nations on the continent adopted the decimal coinage, and I think I now trace the introduction of the decimal coinage into Europe in a rather curious way. In their War of Independence the Americans succeeded, and at the time when this war began their coinage was in a very irregular state. The piece most in circulation amongst them was the Spanish piece of eight, equivalent to the present dollar. In order to have some arrangement and settlement that they could understand, they took, I suppose, as a symbol of independence and republican institution, a decimal system of coinage. We very well know that in that American war a great many French officers took part. Soon after it came the Revolution in France, with all its dreadful consequences, and almost the first thing that the French did was, after the American example, to establish a decimal coinage. Soon, as they advanced into other countries, right, left, north, and south of them at the point of the bayonet, they carried with them republican government, and with it, at the point of the bayonet, decimal coinage. Such I humbly conceive to be the origin, and such is the modern history of decimal coinage in Europe. If I am correct in my conjecture, it is very clear that it was not from any mathematical or scientific discoveries that it was ever adopted. In our day it certainly was so under the impulse of political passion, and political passion is certainly not a thing that should have influence in a measure of great, indeed of universal application, which deeply affects commercial interests, and is a legitimate subject of mathematical consideration.

272. Then you consider the decimal system as a comparatively speaking modern invention.—In Europe it is; and I believe that it prevails in China.

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273. And in India. Was it not an ancient system introduced from India into Arabia, and thence into Europe?—I have never inquired into those things; but I can understand that under a despotism, where the practice is to *cut* the Gordian knot, so delicate a question as metrical subdivision evokes no study.

274. With respect, practically, to the pound integer, you state, at page 7, "In England "the integer of money is 'the pound,' of the value nearly of four ounces of silver; and this, "it is agreed on all hands, ought always to remain the integer." And at page 42 you state, "To alter the value of the pound would be to unhinge all settlements and contracts "of an enduring character. It is doubtful even whether the National Debt could legally "be exempted from the alteration. To abolish the farthing would be (infinitely worse) to "subject the millions to that standing confiscation which we have explained. These on "either side are evils of which no wise man would face the consequences. But no system "in which the two values of 1*l.* and $\frac{1}{4}d.$ are retained can be decimal." You are of that opinion?—Decidedly; the pound of its present value, I mean.

275. You refer to the inconvenience that results from the adoption of a small integer by the multiplication of figures used to express a given sum. It occurs in your pamphlet, at page 16, in reference to the franc, the rouble, and the dollar; and you state, with regard to all nations using a low integer, "All these nations, in expression of any quantity of "money, labour under disadvantages which may be avoided. For large sums, the integer "being so small, a greater number of figures must be used; as, for 534*l.*, in France "13,350 f., in Russia 3372·63 roubles, and in New York 2563·2 dollars, must be uttered "or written." These are the inconveniences which you conceive must result from the use of a small integer?—Certainly.

276. (*Lord Overstone.*) You have stated, have you not, that you have been engaged as an accountant?—Not very long; for the last five years.

277. During your experience, either as an accountant or in the previous occupations of your life, have you found any real practical inconvenience arising from the present system of coinage in this country?—None whatever.

278. You are not aware of any circumstances which would lead you to think that a revision of that system, with a view to placing it upon some new principle more calculated to promote the public convenience is necessary, or desirable?—Quite the contrary.

279. Have you ever found that our present system of coinage is defective in convenience as regards paying and receiving fractional sums?—Never.

280. You do not think that in any respect the existing coinage of this country requires revision or modification?—Not as to its subdivision. I should say that if the fourpenny silver piece were excluded it would save some trouble.

281. Your impression is that our present very peculiar mode of subdividing the pound sterling is conducive to the public convenience as regards the coinage?—Certainly; I consider it an advantage of incalculable estimation, in so much as this forms a part of commercial interests.

282. You consider that the subdivisions continually into halves and subdivisions into third parts are eminent requisites of convenience in coinage?—Certainly.

283. Do you think that the present system of coinage facilitates the subdivision of the pound sterling in that respect in an eminent manner, namely, into 10*s.*, the half of that, 5*s.*, the half of that, 2*s.* 6*d.*, the half of that, 1*s.* 3*d.*, the half of that, $7\frac{1}{2}d.$, the half of that, $3\frac{3}{4}d.$, the half of that, $1\frac{3}{4}d.$, leaving out the $\frac{1}{4}d.$, which of course cannot be subdivided?—I think that the best division that can be obtained.

284. You think that no system of decimal coinage would afford the same facilities of subdivision in harmony with the public convenience?—Certainly not; in a decimal series you cannot carry the division by 2 lower than to 2*s* 6*d.*

285. Do you think that the power of subdividing a pound sterling into a third part, namely 6*s.* 8*d.*, is conducive to public convenience in a degree in which the decimal coinage would not be?—Very materially so indeed.

286. Taking again that 6*s.* 8*d.*, do you think that the subdivision of that into continual halves, under our present coinage, into 3*s.* 4*d.*, the half of that, 1*s.* 8*d.*, the half of that, 10*d.*, the half of that, 5*d.*, the half of that, $2\frac{1}{2}d.$, and the half of that, $1\frac{1}{4}d.$, is upon the same principle more conducive to practical convenience in the transactions of the market than any decimal system can be rendered?—Certainly.

287. You spoke of the division of the shilling under our present system. I think I understand you to consider that by dividing the shilling into its 12 parts or pence you get those sums represented more conveniently as regards the figures which represent it, and also with fewer figures, than there would be under the mil system?—Most certainly.

288. Some evidence has been taken upon the subject of the adaptation of commodities, either by change of quantity or change of quality, to meet the altered value which coins of lower denominations would necessarily assume if the decimal system were introduced; do you think that it is a recommendation of any proposed improvement of the coinage that it should compel, for the purpose of adapting itself to the coinage, an alteration either in quantity or quality of the articles which are to be sold?—I think it would be a great evil.

289. Suppose an ounce of tea or of sugar is now sold for $\frac{3}{4}d.$, under the decimal coinage the nearest equivalent of $\frac{3}{4}d.$ would be three mils; to adjust the price to three mils there must be an alteration in the quality of the article?—Certainly.

290. If an ounce of sugar is now sold for $\frac{3}{4}d.$, a pound will be sold for 1*s.*?—Yes.

291. If the same ounce of sugar, by an alteration in the quality to meet the altered value of the coins is sold for three mils, the pound will be sold for 48 mils?—Certainly.

292. For that 48 mils there would be no coin to represent its value under the decimal system?—No.

293. Consequently, if the sugar now selling at $\frac{3}{4}d.$ an ounce and at a shilling a pound will, under the proposed decimal system, be sold at three mils an ounce and 48 mils a pound, which change will necessitate an alteration in the quality of the sugar, it will also reduce you to the inconvenience of having a new coin in which to express the value of the 48 mils?—Certainly; but I do not see that that is an argument that weighs on either side, because the prices of things consist almost invariably of two denominations of money, pounds and shillings, or shillings and pence, at present, and it would only be transferring the difficulty to another sum of money.

294. The proposed system is to be judged of by its tendency to increase the convenience of the community. The question is, looking at those articles in which the poor deal in retail quantities very extensively, whether the convenience of the market would or would not be increased. I put the case of sugar, first of all, sold at an ounce, and then trace it up to the sum at which we suppose it to be sold in the pound; and I wish to ascertain whether the present system of coinage, or the proposed decimal system of coinage, will give the greatest facility and convenience, and convenience and facility in saving time and facilitating calculation. Under the present system, where the ounce is $\frac{3}{4}d.$ and the pound is 1*s.*, will not payments for those two quantities, and all the intermediate ones, be made with much less trouble and with fewer coins than under the supposition that the price became three mils and 48 mils?—Yes, for the pound of sugar, because there is no one coin of 48 mils, or of 24 mils, for half a pound, or of 12 mils for a quarter pound.

295. Cases have been put to you of articles selling for 7*d.* a pound and 11*d.* a pound, as involving the same difficulties of subdivision as are supposed to be involved in the proposed decimal coinage; will you state whether if an article is sold at 7*d.* a pound there will not be considerable convenience from the fact that the half pound will sell for $3\frac{1}{2}d.$ and the quarter of a pound will sell for $1\frac{3}{4}d.$?—Certainly.

296. The nearest equivalent to 7*d.* in the decimal coinage would be 29 mils; but assuming that 30 mils is more likely to be the convenient coin, will that subdivide into a half pound and into a quarter of a pound with the same facility as the 7*d.*?—No; it will not subdivide for the price of a quarter of a pound at all.

297. Taking again, 11*d.*; the half pound will be $5\frac{1}{2}d.$, and the quarter will be $2\frac{3}{4}d.$; the nearest equivalent of 11*d.* in mils is 45; will the 45 mils divide with the same facility into half a pound and a quarter of a pound as the 11*d.*?—Certainly not; it will not divide so as to meet even half a pound.

298. No reference has hitherto been made to the comparative facility which the two systems, the present system and the decimal system, would afford for mental calculations, for those operations in the mind which the lower orders of people especially must make, hastily and in great confusion, whether in a crowded shop or tumultuous market; will the calculation in mils be equally easy for the common people to make in those cases in which calculations are now made in shillings and pence?—I can hardly form an idea of the trouble and delay, and the squabbles that there will be between shopkeepers and the poor people, when they come to take "parts" of things at the prices given in decimals; but even if the question is not of the parts, as ounces, quarters, or half pounds, but the various quantities of numbers, as, say so many yards purchased across the counter, there are very few persons whose mental calculations would do it; they must have slates.

299. Having expressed a very strong opinion in favour of our present system of coinage, and against the introduction of a decimal system of coinage, will you state whether you have turned your attention to the operation of decimal systems of coinage in other countries in which they have been introduced?—I have not be able to turn my attention to the operation of it, because I have no practical information of what passes there; but I can very easily understand how the decimal system may be convenient there when it would not be here. In France the integer of account is 10*d.*, and the purchases by retail almost always include some pence. There the number of pence is expressed in one figure, a franc being the value of 10*d.*, 9*d.* is 9 dimes, 8*d.* is 8 dimes, and so on. Thus they have no trouble; but with us 9*d.*, 8*d.*, or any number of pence will involve two figures.

300. (*Chairman.*) Is not the French system of account to put down the franc and the centimes or 100th parts marked by two figures, and not by one?—Yes; but I suppose there are never less than 10 or at least 5 centimes passing there; 5 centimes would be $\frac{1}{2}d.$ nearly.

301. If you have to write 25 centimes you use two figures?—Yes; that is where the transaction involves exactly that sum.

302. Or any sum involving more than nine centimes?—The actual values paid are generally the same number of pence, and that number of pence is denoted by the simple figure 8 or 9 in the column next to the francs; at least it may be done so.

303. Is it the fact that you have seen a French account, and know how it is kept?—Yes, I have.

304. (*Lord Overstone.*) Is it not the great distinction between the proposed decimal system in this country and the decimal system which exists in other countries, that we have at the present time, arising from our higher integer of account, a subdivision in our coins very different from that which previously existed in other countries, and which in your judgment is a great advantage to this country?—I consider the system that we have, with-

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out inquiring into what other people have, to be far superior to the decimal or indeed any other system whatever. If we have the pound sterling of its present value, our system of division under it is incomparably superior to the decimal system. If we alter the pound sterling, either we must derange the numbers 20, 12, and 4, or we must alter our farthing, which I consider it is a capital point to retain. In all cases, I think anything that alters the value of the smallest coin, of the coin which is the business coin of the millions, is, I may say, the most perilous experiment a Government can undertake.

305. Your opinion is, that our integer of the pound sterling enables us to avail ourselves of the subdivision of the fractional parts of coins in a way very superior to that which exists or has existed in other countries?—Decidedly, excepting that in Holland and Hamburgh they had nearly the same subdivision; they had not the farthing. I think they divided the fenning at Hamburgh into six parts, and in Holland into eight, 12 fennings or pennings making a schilling, and 20 schillings making a pound. Such was the subdivision of those two republics, which were the most advanced in commerce in ancient times, and who I dare say had wise information upon the subject.

306. Have you considered whether the same circumstance, the high value of our integer the pound sterling, if it be made the basis of the decimal system, would involve inconveniences, as compared with the decimal systems of other countries which are based upon a lower integer of value?—I have considered that particularly, and I see it most clearly that with such a high integer the decimal subdivision would be extremely inconvenient, in at least three fourths of the transactions that take place.

307. Are you of opinion that if we introduce the decimal system into our coinage, founded upon the pound sterling, we shall necessarily have a decimal system of coinage less convenient than that which other countries now enjoy?—Very much less convenient than we now enjoy.

308. The object of the question is not to consider whether the decimal coinage introduced into this country will be less convenient than our present coinage, but whether the decimal system of coinage, which, if we retain the pound sterling, we must introduce into this country, will or will not be necessarily less convenient than the decimal system of coinages which have now been introduced into other countries?—It will be decidedly less convenient than the decimal system that is used in France and America and other countries.

309. The decimal system of coinage means taking the lowest money of account, say a mil, and increasing that money by regular steps of 10 in constant succession?—Yes.

310. Our present system of coinage consists of taking the lowest money of account a farthing, and increasing that by varying steps of progression?—Certainly.

311. Do you not think that there is something obviously reasonable in varying the space between those steps or monies of account in proportion as those monies of account assume a higher value, namely, taking the farthing, and that being a very low value, when you have arrived at four of that quantity, instead of continuing to enumerate onwards in farthings, you take a new money of account, namely, 1*d.*, which consequently is subdivisible into a half and into a fourth part, namely, a halfpenny and a farthing. Having so got the 1*d.* as your next money of account, but that money of account being of a considerably higher value than a farthing, you multiply it onwards to a greater extent, until you arrive at 12 of those pennies, and having done that you now take a new money of account, the 1*s.* Having taken 12 of the preceding money of account, because you are dealing with a higher value, the shilling again affords great facility of subdivision into 6*d.*, 3*d.*, $1\frac{1}{2}d.$, and $\frac{3}{4}d.$ Having now arrived at money of account of a still higher value than the 1*d.*, you take still more steps in that money of account before you take your last step, namely, the pound. Upon that principle you take 20*s.* to the pound, increasing the number of steps as you rise to monies of account of a higher value. Having thus arrived at a pound, you again obtain that remarkable capacity for subdivision into continual halves to which we have already alluded, namely, 10*s.*, 5*s.*, 2*s.* 6*d.*, 1*s.* 3*d.*, and so on to the lowest stage. Is it, or not, in those characteristics that you consider the advantages of the division of our pound sterling consists?—Your lordship stated very nearly the opinions that I entertain.

312. Will you have the goodness to state any point in which you do not entirely agree?—I consider the advantages to lie chiefly in the arithmetical properties of the numbers 20, 12, and 4; 20 is divisible by 4 and by 5, as the 12 is by 2 and by 3; thus you will embrace with the multiples of those prime numbers as nearly as possible all the divisions which can be required by business. The advantage which your Lordship has just pointed out in the number 20 is another very material one in my estimation in accounts. It is this:—You add up a certain number of shillings, and a very large number of shillings it may be, with half the trouble that you would have in adding the same number of shillings if they were set out in figures not admitting of the figure 1 as 10. You reckon up, say in other figures in the nine digits, to about 200 shillings, and you have perhaps 200 more by simply counting twenty 1's in the column. That I consider a very great advantage, which would be entirely lost in the decimal expression of the same values; for with the nine digits equally in both systems, in every odd sum of shillings you have in decimals a figure 5 in the column of cents annexed to the florins. Besides, for the purposes of division into what I call clean quotients without any remainders, the numbers 20 and 12 are perfection itself; but inasmuch as small quantities are required for the farthing, it is the most valuable selection, the number 4; it is capable of binary

division, and it enables us in our books of considerable accounts, such as those of merchants, bankers, and public institutions, to dispense with very small coins, the farthings.

313. In all the decimal systems which at present exist, the space between the lowest money of account and the highest money of account is divided into 100 parts; if the decimal system be introduced into this country, with the pound sterling as the highest nteger, that division must necessarily be into 1,000 parts?—Yes.

314. Have you at all considered in what way it would probably work; would it or not be necessary to introduce one or two intermediate stages of monies of account between the lowest and the highest denomination?—There certainly must be between the mil and the pound two monies of account, and that certainly would add very much to the trouble of book-keeping and calculations.

315. You think that it would greatly diminish that facility and that accuracy, both in the keeping of accounts and in mental calculations, which is found to attend decimal systems which are differently circumstanced?—Certainly.

316. (*Chairman.*) In dealing with ordinary calculations and accounts is there any greater facility, or any less facility, or any greater security for accuracy, or any less security for accuracy, in dealing with the portions of accounts which represent pounds, or those which represent shillings, pence, and farthings?—There is certainly greater facility in dealing with monies which are only of one denomination, whatever it may be, than those which are of several denominations.

317. Is not the notation used and the arithmetical operation effected in the stating of the pound sterling precisely the same, to all intents and purposes whatever, as those arithmetical operations which would arise out of the statement of the account in the decimal system?—It is the same, if you merely have to do with adding up the figures, but it is not the same in the great business of account.

318. It is the same in the addition; is it not the same in the subtraction likewise, and is not the principle the same, that each column of figures differs from the preceding right-hand columns in decimal proportion?—That is certainly true; but the thing that is latent that requires to be brought to light is this: You have twenty-three times in twenty-four more figures to copy in your books, or higher figures to trouble you, in arithmetic; besides which, you must have three columns of money denomination, instead of two, which you have now. In business it is necessary, I suppose, in three places in four, to enter sums of money very quickly, and having to enter the minor denominations in three columns instead of two, there would often be a figure placed in a wrong position, and a mistake would arise, which would give a great deal of trouble; but besides that, the mind, in copying figures, carries them, the sums of money, in pounds, shillings, and pence, and easily sets them down correctly by once looking at them. If, instead of our present arrangement, you had a high value, say 17*s.* 4*d.*, expressed in significant figures in decimals, the mind does not carry them so easily and correctly. A clerk must either look twice to the thing that he copies from before he copies it, or in the haste of business he will misplace his figures, which is to be avoided. If he looks twice at the copy that he takes it from, it is very likely that copying a column of figures from one book into another he looks the second time at the line above or at the line below the proper one, and so makes another mistake.

319. Have you any experience, either of the accounts of America or France, which will enable you to say that those inconveniences are inconveniences that do result from the decimal system; or have you any experience in foreign countries where the decimal system, though not applied in the exact mode in which it is proposed by the parliamentary committee to apply it, is applied, to enable you to say that those inconveniences do occur?—I have not sufficient experience of those things to say anything about it; but as their integer of account is so much less than ours there is no analogy between the cases.

320. If you find that in those important accounts of the dividends payable at the Bank of England which are payable to 300,000 persons, all the calculations of dividends, and all the fractions, are brought up to three decimal places, and that no such inconveniences as you have supposed are stated to have occurred from that system of notation, would that alter the opinion you have just now expressed?—Those calculations are, I understand, for a peculiar purpose; that fractions of the penny, accruing on dividends but never inserted on dividend warrants, may be ascertained, and the sum of them, plus the sum of the dividend warrants, proved to balance the sum of the half year's interest on the public debt. A calculation of this kind, during which the stock accounts are closed for several weeks, may be performed by the numerous officers of the Bank with a degree of leisure which cannot be hoped for in those transactions between man and man, in which payments of money are going on at the rate of thirty thousand *every minute of the day.*

321. (*Lord Overstone.*) Supposing you had an account involving only pounds and pence, not involving shillings, would you not consider that that account afforded less chance for error, and greater facility for general correctness, than an account that involved shillings also?—I understand your Lordship to mean that the shillings are extinguished; that there happen to be none in that account. Then I should say, certainly it would.

322. Is not this the reason why shillings are introduced into our system, that to pass from the penny to the pound would involve so high a multiple of a penny as to give rise to great inconvenience and chance of error?—I have no doubt of it.

323. And the introduction of the shilling is for the purpose of facilitating the transition in accounts of any calculations, both written and mental, in passing from the penny up to the pound?—I conceive it to be so. It is also for the purpose of conciseness in the

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expression of quantity. For instance, in the case of 14*s.*, instead of writing 168 pence you put 14*s.*

324. Is not the introduction of the shilling between the penny and the pound with a view to facility, to accuracy and to conciseness of expression, analagous to the case we suppose of the introduction of the florin and the cent between the mil and the pound for the same purposes?—It is.

325. But as you have already agreed with me that an account which did not involve shillings would be less inconvenient and less liable to error than one that does involve them, does not it equally follow that the necessity of introducing the florin and the cent must necessarily bring with it the chances of error and inconvenience which would not exist, and do not exist, in decimal coinages that do not require the introduction of such steps between the highest and lowest integer?—It certainly does; although what has principally fixed itself upon my mind is, in reference to our own system, the great value of being able to divide by four, by five, and by three, and by their multiples. The point that your Lordship has just mentioned has not excited my inquiry so much as to be able to speak upon it.

326. It appears from your evidence that the practical working of the decimal system, involving 1,000 places between the highest and the lowest money of account, and the arrangements necessary to meet that difficulty, has not been carefully considered by you?—What has most seized upon my mind is the advantages which we possess for expressing quantity in all its varieties above every other system, decimal, or any other that can be contrived. And it has seemed to me to be an indisputable point that the great object of any subdivision, either of weights or anything else, is to express quantity in the smallest possible language, written or oral.

327. With the greatest variety and the greatest conciseness?—Yes; that that is the paramount object; because the calculation is once made and then done with; but the figures produced by that calculation are copied perhaps 1,000 times. Then, as the parts of anything must be found by division, that series of numbers which enables you to divide the concrete integer by the greatest variety of numbers affords the greatest possible facility for describing the varieties of quantity in the most concise language. A great deal has been said about some supposed advantage in calculating the price of articles bought in numbers by decimals. If the price of everything that was calculated consisted only of one denomination of money, there might be that advantage; but when we consider that prices consist generally of more than one denomination of money, and that all sums forming some proportion of the pound will consist generally of two, sometimes of three figures, and that the quantity to be bought will consist of an arbitrary number, and that those two or three figures of decimal subordinate values are to be multiplied by that number, there are very few, I believe, that could do it by mental arithmetic. In that case, the poor, many of whom cannot write or even read, would find it impossible to make their calculations. Therefore I think the proposed decimal plan would be a very great evil.

328. (*Chairman.*) You come then to the conclusion expressed in your pamphlet at page 13, that in England, with regard to the subdivision of the integer, "Mathematical "science has evidently made in this cause exertions worthy of her most earnest studies." And again continuing, in page 14, "For the construction of money and the subdivision of "the integer, the pound sterling of its actual value, subdivided by 20, by 12, and by 4, "displays the perfection of mathematical science." Again, in page 19, you say, "To "spread over the world this unrivalled system, to carry to all nations what is no feeble "help in commercial activity, and to have in what most occupies them one common "language, these are aims of which ambition may be proud." Do you adhere to that opinion?—Most unquestionably.

329. It has been suggested that in proportion as mechanical science and the cheapness of production extend in any country, in that proportion ought the integer to be lowered for the purpose of facilitating the purchase of commodities which by the hypothesis are lowered in price; is it your opinion that as they continue to advance you ought to lower your integer?—No.

330. Is it your opinion that in a rich, advancing, and highly improving commercial country it would be more natural to find the integer rising than falling?—I would never disturb the integer; that would produce such confusion in accounts, and in the value of long subsisting contracts, mortgages and the like, that there would be perpetual discord.

331. (*Mr. Hubbard.*) You have laid a great deal of apparent stress upon the advantages of the harmony which exists now between the progression of our weights and measures and the progression of our coins in their divisions?—I beg pardon; I was not aware of any connexion between our weights and measures and our coins. It is a scientific supposition that there ought to be some sort of relation between the weight of the coin and the weight of the ounce; but I do not see any necessity for it.

332. I mean in this respect, that the binary division being applicable both to weights and measures and to coins, and to the calculations, particularly of the lower classes, in their dealings, affords a degree of facility which would not exist if the coinage were decimally divided?—That is my opinion.

333. The advantages of the division of coins must be taken, I apprehend, with reference to the purpose of coins, that purpose being the payment for quantities of commodities?—That is a material element in the case; but the division of coins I take to be more a thing

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of mathematical inquiry, as to what will express the various quantities in the smallest compass. It happens at present that the farthing is peculiarly and more exactly the coin for the service of the humbler classes than can possibly be invented in any other way. That being the case, and the divisional numbers 20, 12, and 4 being of such value, the integer will mount up to the pound of its present amount.

334. I quite concur with the advantages which you seem to attach to the existence of a coin of the value of a farthing, and I suppose you would infer from that, that if the farthing were disused, and a coin substituted for it, say worth a farthing and a half, the poor would lose the advantage that they now possess, by having in fact a larger minimum coin?—Yes.

335. If, on the other hand, you substituted for the farthing a coin not a little more but a very little less in value, do you apprehend that the new coin would have any inconvenience in its use, as compared with the farthing?—Yes; it would have this inconvenience, that if the farthing exactly meets the generality of the purchases of the poor, you would very rarely be able to commute a certain number of your new coins for any other number of farthings.

336. Now we will assume that the prices of commodities are accommodated to the new coin, and assuming that to be practicable, I would call your attention to the amount of variations in prices under the value of 8*s.* of our present coinage, and under the value of four florins of the new coinage, which would give to the poorer classes an opportunity of buying at the lowest price per ounce, that of which the price per lb. can be introduced as under 8*s.* in the one instance, or four florins in the other? Between 8*s.* and four pence there are 24 prices at which the pound can be divided exactly by 16. On the other hand, between four florins and one cent and six mils there are 25 prices at which the pound is exactly divisible by 16?—But then what has appeared to me all through is this; it is very easy to imagine things, now sold at certain prices, to be sold at other prices; but these things must be sold at the same price still.

337. Supposing the prices could be so adjusted, there would be the same facility of division?—Certainly. It is an arithmetical consequence, that where there would be 24 in our present system there would be 25 in the new system; but you must then alter the price of the pound weight.

338. The price per pound would have to be slightly varied; but the price of a pound would be rather more varied than you seem to anticipate. If you refer to the note in page 8, you will see that the variations must be much wider than you perhaps think?—The variations cannot be less than one twenty-fifth part, or four per cent.; but that $\frac{1}{25}$th part of the gross price of the thing is so much deducted from the profit of the trader. At this present state of competition in trade, the 25th part of the whole price of an article is a very material object.

Adjourned to Tuesday next, at 12 o'clock.

Mr. Shaw has since addressed the following letter to the Right Hon. the Chancellor of the Exchequer in illustration of his evidence:—

DECIMAL COINAGE.

Right Honourable Sir, 2, Old Park House, Bristol, 27th Feb. 1857.

Observing in your speech last night allusion to the effects of a Decimal Coinage "*on the expenditure of the working classes,*" and being one of the witnesses examined *particularly on that point* by Her Majesty's Commissioners, I think it my duty most respectfully to convey to you one very material remark, which the questions put to me by the Commissioners did not tend to elicit.

It appears in my evidence (q. 217, 218, 219, 220,) that the same prices now commonly charged per lb., &c., for tea and other necessaries of life are, in a Decimal Coinage, represented by numbers which very rarely indeed will divide by 16 or 8 or even by 4, so as to make the price of an ounce (or the small quantity usually bought by poor persons) without leaving a "remainder"—some part of a mil; and that the tradesman must charge this "remainder" as a mil; to the frequent loss of the poor.

Now it is supposed—perhaps universally—that if, as well as a Decimal *Coinage*, we had Decimal *Weights and Measures*, this discrepancy would be removed. But this is altogether a mistake; for, in the close run of competition to sell at the lowest possible rate, the price of the lb. &c., would nine times in ten have mils annexed (as tea at 3*s.* 8*d.*=1 fl. 8 c. 3 m.; butter at 1*s.* 4*d.*=6 c. 7m.; and so of other things); then, dividing the price of the lb. by 10, there would be a remainder, so many tenth parts of a mil.

It is quite impossible to subdivide the English Pound Sterling in decimal gradations without this inconvenience generally occurring. Where the "integer" is of lower amount, as in France, Russia, &c., the case may be different; and the great beauty of our subdivision is that the "shilling," so far removed from the integer, and the coin *most* frequently used, is divisible by 48 (farthings); *i.e.* by 2, by 3, by 4, by 6, by 8, by 12, by 16, and by 24. The *same value* in Decimals is 5 c. divisible only by itself and by 2.

It is a deep sense of the value of your Honours time, that restrains me from showing other excellences of our system; but perhaps I may, without falling into that error, most respectfully suggest that in the answer to question 212 I endeavour to give, concisely, the *theory* of metrical subdivision.

I remain, &c.

ROBERT SHAW.

To the Right Hon. Sir G. C. Lewis, Bart., M.P.,
Chancellor of the Exchequer, &c. &c.

Tuesday, 13*th May* 1856.

The Lord MONTEAGLE OF BRANDON in the Chair.

Dr. J. E. Gray.

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Dr. JOHN EDWARD GRAY, examined.

339. (*Chairman.*) You have turned your attention, have you not, to the present system of British coinage, and to the various propositions that have been made for its improvement and alteration?—I have; I am the author of "Decimal Coinage, what it ought and what it ought not to be, by One of the Million," and of several papers on the subject, in the "Times," "Spectator," "Economist," and other papers; and since the publication of my pamphlet I have collected together all the works and papers scattered in periodicals and other publications on all sides of the question, connected with the subject, that I could procure, from the commencement of the discussion in 1775. This collection I have placed at the disposal of the Commissioners, and I now see part of it on the table. I have also made a collection of the smaller coins now current in different countries, both under a decimal and a mixed system of coinage.

340. Have you formed a determinate opinion with respect to the present state of the coinage, how far it answers its general purposes, or how far it requires re-consideration and amendment?—My own impression certainly is that it is as perfect a coinage as we possibly can have; our present system combines the greatest amount of advantages, as far as the small trader is concerned, and seems also to offer every desirable facility for keeping accounts.

341. So that in both points, as furnishing coins of circulation, and as furnishing coins of account, you consider that it is a coinage with which the public have reason to be satisfied?—I am decidedly of that opinion. I speak from practical knowledge of the coinage of various countries, having travelled repeatedly on the continent in countries where the decimal coinage is in use, and having had considerable experience in commercial transactions with various countries, leading to much commercial correspondence.

342. That being the case an inquiry into the preferableness of one alteration or another would be superseded by the prior question of whether any alteration was expedient?—I I should think so; it is one of the most important points which I look forward to with reference to the commission, that it will fully and dispassionately enter into the question whether it is desirable that any alteration should be made or not.

343. Will you be so good as to state to the Commissioners the characteristics of the present coinage, which in your judgment establish its merits and its preferableness, distinguishing the question of circulation from the question of account?—The divisions by 20, by 12, and by 4, offer so many more divisions and subdivisions than any other system of coinage that it appears to me to be the best for all purposes, especially for passing from hand to hand, and also very superior to any other for the purposes of accounts, as the breaks between the several divisions afford good resting-places for the mind. The current coins of this country represent the whole, $\frac{1}{2}$, $\frac{1}{4}$th, $\frac{1}{8}$th, $\frac{1}{10}$th, $\frac{1}{20}$th, $\frac{1}{40}$th, $\frac{1}{60}$th, $\frac{1}{80}$th, $\frac{1}{160}$th, $\frac{1}{240}$th, $\frac{1}{480}$th, $\frac{1}{960}$th, and the $\frac{1}{1920}$th part of a pound. The whole, the $\frac{1}{2}$, $\frac{1}{3}$rd, $\frac{1}{4}$th, $\frac{1}{8}$th, $\frac{1}{12}$th, $\frac{1}{48}$th, $\frac{1}{96}$th of a shilling. The whole, the $\frac{1}{2}$, $\frac{1}{4}$th, $\frac{1}{8}$th of a penny, and for some of our colonies they have also coins struck at the Mint represented by $\frac{1}{3}$rd and $\frac{1}{10}$th of a penny; that is independent of the non-decimal and decimal coins struck at the Mint, entirely for the colonies or dependencies of the Crown.

344. Do not those considerations which are involved in the reply with which you have now favoured the Commissioners apply rather to the question of coins and their use for the exchange of commodities than to the question of the record of payments?—I understood that the question before the Commissioners was the decimal coinage, not decimal accounts. I have always looked upon coins to represent the money which was required in buying and selling by retail in our daily transactions. In all other cases when you have large accounts, as in wholesale or the higher commercial transactions, you have bank notes and bills, and other materials for carrying on the currency. I think this is proved by the fact that we have no coin in actual circulation larger than a sovereign; there are five-sovereign pieces, but they are scarcely in circulation. It appears to me that coins are made more for the smaller or retail transactions of life, and are, therefore, chiefly important to the mass of the people, and not to the bankers and wholesale dealers. A banker well observed to me, "We do not care about gold or silver, as far as we are concerned; we would rather there was not any; cheques and notes answer all our purposes, coins are only required for retail traders." For this reason I cannot but regard the opinion of bankers on the subject of decimal coinage as only of a secondary importance.

345. Do you consider it is possible to consider the state of the coinage of any country, without considering as well the question of the payments and the exchanges for the purposes of circulation, and the record of those payments as matters of account?—It appears to me that the present system affords under the best form all the necessary materials for satisfactorily and easily reckoning of large accounts, and at the same time the greatest possible facilities for the common trader.

346. The object of the question was to ascertain whether, in considering coins, it was not necessary to have a relation also to the facility of recording the transactions for which the coins were used, and whether, in considering the question of accounts, or the records of

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transactions, it was not necessary also to refer to the coins which were used in those transactions?—It appears to me that the present coins afford every facility for that record. Indeed, looking at the various systems of decimal coinages proposed, I am satisfied that it affords much greater facilities than the system which has been recommended by the Committee of the House of Commons for the purpose.

347. In stating the almost infinite number of divisions of which our present coinage is susceptible, and which you have already put in evidence, is not it rather a matter of possible advantage in the use of coins as instruments of exchange than in the use of coins as leading to the record of the transactions themselves?—The subdivisions I referred to have no effect on recording transactions. Our system for that purpose is the most simple possible; we have only to record pounds, shillings, and pence, and occasionally you may say farthings, all which we have as coins of circulation as well as coins of account. The advantages gained by the multiplicity and varied subdivision of our coins do not in the least interfere with the simplicity of our system of recording accounts, while they afford great facilities in paying various sums, so it appears to me, and in computing the prices of articles mentally.

348. Taking into account that our fractional coin has a column in which even the ordinary principle of reducing fractions to a common denominator is not adopted, but you have two, and taking into account further that in the column of pence you have a different principle, for there are two columns in the pence, and you have a different relation between the two columns themselves as *inter se* and the carrying over from the second column to the shillings, and taking into account that the same arises in the shillings, namely, that it is a decimal proportion between the two columns of shillings, but a different proportion where you carry it to the pounds, is not that a complication that will give a preference to the decimal system?—I think not; and I do not express only my own feeling upon the subject. I have never had any difficulty, and I have never heard of any difficulties in adding up the shillings, pence, and farthings. By all the information that I can gain from others on the subject, speaking of commercial people, they have a strong feeling that the result produced by these varied divisions is far less wearying than that eternal numeration of 10, 10, 10, and is much less liable to error. But it would appear that this is not a matter of necessity. Until a comparatively recent period, even in this country there was no coin to represent a pound sterling (the nearest coin being a guinea), while in several countries abroad, especially in Germany, as at Vienna, and even in the trading towns, such as Hamburg, accounts are kept in "imaginary coins," very different in value and division from the current coins. There is no reason why those who prefer it might not even keep their accounts in decimals of a pound, without any alteration in our present admirable and convenient coin.

349. You stated, did you not, that your attention had been turned not only to the British system of coinage, but to the system of continental coinage?—Yes.

350. That being the case, does it appear to you that our system of coinage in England is more or less, or equally convenient with that of the franc and the centime which prevails in France?—I should think that they were equally well understood by the people who are in the habit of using them; but I wish to draw the attention of the Commissioners to the fact that the dollar and the cent, or the franc and centime system, are not the decimal system which has been urged forward in England by the advocates of the change, by the witnesses before the parliamentary committee. They have urged forward another system which bears no relation whatever to any continental system, at least, I cannot perceive any similarity, and that is one of the fallacies by which many of the people, who do not object to a change, have been deceived. I am quite sure that people have been deceived by the experience of the French coinage, into thinking that therefore another decimal coinage, though based on a different system, would afford the same facilities; but I am satisfied that it would not be found so in relation to a system so fundamentally different as that proposed; although there might possibly not be any great difficulty in mercantile transactions, where the greater part of the sums were measured by pounds, it would produce such immense difficulties in the pecuniary transactions of the smaller traders, which form nine-tenths or even a larger proportion of the dealings of the whole population, that I do think it would inflict an enormous evil upon the public themselves.

351. The object of the question was to obtain information from a witness who, like you, has turned his mind to the comparison of the British system of pounds, shillings, pence, and farthings with the continental system; can you state whether, taking the question of comparison between the franc and the centime system and our own system of pounds, shillings, pence, and farthings, you consider that they are either equal or that there is a superiority on the one side or the other?—I think in practical use, in the countries where people are used to each, they are pretty nearly equally well understood, what appears to me to be a far superior system to the franc and centime, is the dollar system of America; but for general purposes I do not see the great superiority of one or the other. But in our case we are to consider that to induce us to make a change there should be a decided superiority, as there is a great evil in any change of the kind, which will produce very considerable difficulty, confusion, and consequent want of confidence in the mass of the people.

352. I need not ask you whether the possible evil resulting from the change must not be increased or limited by the further consideration, whether that inconvenience is the temporary inconvenience, which always results from laying down one long acknowledged system and adopting a new one, or whether it is inherent in the nature of the change, and therefore of a

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more permanent nature?—The change which has been proposed by the Committee of the House of Commons and supported by the Decimal Association, is such as no country has as yet attempted; no country has as yet adopted the decimal coinage, except under peculiar circumstances, such as a most depreciated and confused state of its currency, or as immediately following a revolution or some other violent alteration, when the public mind was prepared for great changes, or else it has been forced upon them by a conquering army; but even then how have they proceeded? Every country that has adopted a decimal system has based it on the small current coin of the people; they have never altered the smaller coin, analogous to our penny, in the least. Thus, in France the sous become five centimes, and the halfpenny of the United States became the cent or 100th of the dollar. The *livre* of France became the *franc*, with only an alteration of one-eightieth, whereas, if the system proposed by the committee is carried into effect here, it will alter the value of all the coins below sixpence, destroy the poor man's unit of all his purchases, the penny, and so break up and destroy all his previous notions and habits, that I cannot but believe that it will take an exceedingly long time for the transition, and cause most serious confusion in all our daily commercial dealings.

353. (*Lord Overstone.*) You state that it would alter the value of all coins below sixpence; will it not also alter the value of all the denominations involving the multiples of a penny above sixpence?—Yes; undoubtedly it will, and it will also change the name of every coin that exists except the pound.

354. (*Chairman.*) You have stated as a general law the circumstances under which a change like the decimal change has been adopted in countries in Europe and America, how does the change which has taken place in Switzerland bring it within that category?—The change that has recently taken place in Switzerland is merely the revival of a former change. Napoleon, in 1803, forcibly introduced the decimal coinage into Switzerland, which in 1803 formed a part of the French Empire, and therefore had the same coinage; when she declared her independence she went back to her old coinage, but the multitude of travellers in that country generally going from France took with them French money, and the consequence was, that the hotel-keepers kept all their accounts in French francs; in fact, however, the change in Switzerland, going back to the French franc, was merely going back, in consequence of peculiar circumstances, to that which had been forced upon them many years before. From the edition of Murray's handbook for 1846, an idea may be formed of the state of coinage before the last change. "There is hardly a "country in Europe which has so complicated a currency as Switzerland; almost every "canton has a coinage of its own, and those coins that are current in one canton will "not pass in the next; let the traveller, therefore, be cautious how he overloads himself "with more small change than he is sure of requiring. Detailed tables of Swiss coins are "given below, but it is scarcely worth the traveller's while to perplex himself with their "intricacies, since he will find *French napoleons* and *francs* current nearly all over Switzer-"land." The general and uniform introduction of the French system must have been a boon to Switzerland under such circumstances; I have heard this change cited as an example that we might follow, but we have not been prepared by the previous use of the system. French coins do not circulate here, and we already possess a uniform and most perfect system, as well as the most beautiful coins of any country in the universe.

355. Was not the state of things antecedent to the late assimilation of the decimal coinage throughout the whole of the federal states, wholly independent of anything but the free will of the people of Switzerland themselves, and the adoption of what they considered a better thing for a worse?—The last change may have been, but it was the adoption of a system which, by reason of travellers continually carrying the French coinage thither, had been made quite consistent with the habits of the people; at the same time, the change in Switzerland is not so perfect as one would expect; even now postage stamps are sold in Battzen, and it is much disliked and resisted, especially in the German cantons. I have already stated that in all the countries where such a change has been made, it was always where there has previously existed a confused and complicated state of the coinage, or a depreciated currency, or both, or the people had been forced to adopt it by the will of a conqueror; these circumstances were all combined in Switzerland; there was a different currency in almost every little state, and it was a great boon to them to obtain a uniform state of currency, instead of a depreciated and varied state, hence the change was more easily made in Switzerland.

356. How would you apply your general reasoning, upon the causes of the adoption of decimal coinage, to the State of Sardinia?—Equally with Switzerland, Sardinia formed, at the period of its first introduction, a part of the French Empire. I will give you a French account of the introduction of the decimal coinage into Sardinia. "Lorsque le "Piemont fut occupé par l'armée Française, il prit le nom de *Nation Piemontaise*; ensuite "celui de *Gaule Subalpine;* enfin, cette contrée de l'Italie fut réunie à la France. "Pendant le temps ou le Piemont a été connu sous le nom de nation Piemontaise on y a "fabriqué des demi écus a la même taille que les monnaies précédentes, plate 5ª No. 15. "Les monnaies qui ont été fabriquées a l'époque, ou ce pays commença à porter le nom de "*Gaule Subalpine*, sont la pièce de 20 francs (pl. 3, No. 26.) et celle de 5 francs (Pl. 5. No. 16) "C'est une loi de la commission executive qui à ordonné la fabrication de ces deux pièces. "La pièce de 20 francs dite Marengo, est au titre de 0.9 decimes du poids de 5 deniers

" 0.19, et la pièce de 5 francs au même titre et poids que celle de France. Aujourd'hui " (1806) le systeme monétaire de l'empire Français est établi dans ce pays."

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357. At present is the law with respect to the coinage of Sardinia identical with that which Napoleon introduced?—Exactly, quite identical; the French franc even passes in Sardinia; and I have some coins of Sardinia here. The decimal system of coinage was introduced into Venice in 1800; Sardinia (La Gaule Subalpine) in 1802, and here Napoleon named the piece of 20 francs the "Marengo," in memory of the battle of that name, which reduced the Piedmontese to French subjugation; in Switzerland (Helvetic Republic) in 1803; Holland in 1806, (Holland, including Belgium, being a part of France from 1810 to 1814;) Westphalia in 1809, the king Joseph Bonaparte having coined gold and silver pieces in 1808, 1809, 1810, and 1812; yet this country at the peace returned to its old mixed currency. The extension of the decimal system on the continent of Europe is almost entirely owing to its having been overrun by Napoleon, and the desire of Napoleon by means of French coins to perpetuate his personal glory, and also to satisfy the vanity and desire for universalism so prominently exhibited by the French nation at the time of the revolution, a feeling by no means extinct even now. For this purpose the French Emperor carried with him a mint, and as soon as any country submitted to his arms, he "reformed" the coinage, imposing on it the French decimal system. Indeed it is curious to observe the uniformity and pertinacity with which this idea was carried out. At Baden in 1808 Napoleon made it an article in a secret treaty that a coin should be struck with his head, as Emperor of the Bund; a five-franc piece was consequently struck, which is valued in a French numismatic work as worth 20 pounds sterling; indeed it is believed that the Grand Duke only struck a single example, and the die was then broken. (See *Bonneville, Ency. t.* 1, *f.* 3.) The system certainly eventually took root in several of these countries, but then we must recollect that many of the difficulties experienced at its first introduction had passed away by length of use, and that the recurrence to the old system after the peace would have been a recurrence to fresh difficulties and confusion affecting a new race of men; so that when we speak of the French system having been *adopted* by Belgium, Holland, Switzerland, Sardinia, referring to the latter (not the former) period of this adoption, we should recollect that these countries were once a part of the French empire, and consider the circumstances under which it had been previously introduced, the length of time that they had been previously inured to it, and in most cases also the intricacies and disadvantages of the confused and complicated system which had preceded its introduction. On this head Mr. Adams observes, "During the conquering period of the French " Revolution, the new system of French weights and measures was introduced into those " countries which were united to the empire. Since the severance of those countries from " France it has been discarded, excepting in the kingdom of the Netherlands, where by two " ordinances of the king it has been confirmed, with certain exceptions and modifications, " particularly with regard to the coins." P. 21.

358. On the whole you consider that it would be most expedient to adhere to the present system of coinage in England; but if a decimal coinage was adopted, such objections, in your judgment, apply to what is commonly called the pound and mil scheme, that viewing it in itself you consider that it would be inexpedient and imperfect?—Exactly so, and exceedingly injurious. I have drawn up a statement of my opinion of the two systems, which I beg to lay before the Commission. It was first issued in September 1854.

A *Decimal Coinage*, as distinguished from our present mixed duodecimal and vicesimal one, requires that all the coins of account should proceed in a regular decimal progression; the one being equal to ten of the next below it, so that, when accompanied by a decimal system of weights and measures, all sums will only have to be performed by simple instead of compound arithmetic. To induce the people in general to make so important a change in their habits, all unnecessary complication, and all change in the value of the existing coins, ought to be sedulously avoided, so as to let the new system work its way by its simplicity and evident advantage.

Two systems have been proposed, the one dividing the pound into 1,000 farthings or *mils*, the other counting the pence by tens, and having coins of one or more ten-pennies. The advantages and disadvantages of these systems may be thus summed up:—

The Pound and Mil Scheme.

1. It alters the value and name of all the coins below the value of sixpence, and the name of the shilling and sixpence.

2. It doubles the amount of the coin of account next to the pound, and more than doubles the value of the coin of account next below that; hence it requires, in all accounts, attention to the lowest coin of account, making the third column of decimals, and will have the effect of increasing the price of all articles of common consumption.

3. The lowest coin of account is not sufficiently small for the purposes of trade, and

The Penny and Tenpenny Plan.

It does not in the least degree alter the present value of a single coin now in circulation, and requires no alteration of names.

It reduces the amount of the second coin of account by one-sixth; and as it does not alter the value of the lower coins of account, it does not necessitate any change in the manner of keeping accounts.

The penny may be divided into cents, or tenths of a penny; it may be divided, in

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especially for exchanges; and it cannot be divided without a very large number of figures.

4. It requires the immediate withdrawal of all the copper coins, of the three- and four-penny pieces, the crown, and the half-crown among the silver coinage, and eventually requires an entire change in the whole silver and copper coinage.

5. It requires the introduction of several new copper and silver coins, as the 1, 2, 3 and 5 mils in copper, and the 10 and 20 mils in silver.

6. It requires four coins of account, or the system is not *decimal*, but *millesimal*.

7. It requires an abstruse decimal system of notation, difficult to be comprehended by the less informed, and involving great risk of error in its use.

8. The accounts being kept in farthings or mils (which are farthings reduced in value), it often requires more figures than the present system to express it.

9. It requires that all duties, tolls, stamps, postages, and the wages of soldiers, sailors, and others, and indeed all contracts between man and man which are estimated in pence or farthings, should be adjusted (that is, altered) by Act of Parliament or private agreement; and it alters the present price of bread, meat, sugar, vegetables, soap, calico, and of all articles of universal consumption; as they cannot be accurately or correctly represented by the proposed new coins.

10. It retains the pound sterling, which is proposed to be divided into 10 florins, 100 cents, and 1,000 mils. Indeed some of the advocates of this system propose to change the name of the *pound* to a *unit* sterling (*Pasley, Obs.* 145); others recommend that the pound should be altered to 1 pound and 10 pence; and others that the pound should be abolished, and its place taken by the half-sovereign.

11. It necessarily leads to an alteration in the gold standard of value, inasmuch as the present price of an ounce of standard gold cannot be expressed by it with fewer than five places of decimals. It also requires the debasement of the gold standard more than one and one-half per cent., and a depreciation of the copper coinage four per cent.

12. The new coins offer no facility of comparison with those of other countries that have adopted a decimal system, as not a single foreign coin of those countries bears any approximate relation to the florin, cent, or mil; and as the value of the smaller coins of account is changed, it requires an entirely different plan (and set of tables) to calculate the exchanges between the English and foreign moneys.

13. It does not afford the means of accurately computing sums, *so as to enable any one to balance accounts calculated by it, with sums calculated by the present English coin-*

calculations, into mils (or 100ths of a penny), so as to offer advantages in calculating profits and exchanges not to be found in any other coinage in Europe.

It does not require the withdrawal of a single coin now in use.

It will only require the introduction of two coins, viz. a five-penny and ten-penny coin in silver; and these need only be added as the old and worn shillings and sixpences are called in to be re-coined.

It only requires two coins of account, agreeably with the universal currency of all countries in which a decimal system is in use.

It does not require a decimal notation, except when a sum less than a penny is indicated; and then that may be marked by a vulgar fraction, except where it is wanted in a calculation.

The accounts being kept in pence, it does not require more figures than the present system.

It does not require the alteration, by Act of Parliament or otherwise, of any toll, &c., or of the price of any article of consumption; as the value of the penny and farthing, or any other coin, is not altered.

It does not involve the throwing out of use of the pound sterling; it only renders it no longer a coin of account, like our present half-sovereign, crown, half-crown, and florin. There can be no reason why the pound should not be as much used in conversation and commercial transactions as those coins, or as the napoleon among the French, the eagle and half and quarter eagles among the Americans, &c.

It does not change the present gold standard of value, as the sovereign will be equivalent to 24 tenpences. It leaves the subject of the currency untouched, as alien to the question at issue. See my "Decimal Coinage, what it ought and what it ought not to be," p. 26.

The tenpenny coin affords the greatest facilities for comparison with the coins of other countries having a decimal system,—the franc of France, Belgium, Switzerland, and Italy being nearly equivalent to *one*, the florin of Holland and Germany to *two*, and the dollar of America to *five* of these coins: and as the value of the penny and its tenth is not altered, the method and even tables now in use for calculating exchanges and averages will not require any alteration.

It affords a correct and easy means of computing by simple arithmetic the sums required in commerce, and especially the computation of interest and exchanges; and

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*age, or by any foreign system of currency.** This evil might be partly avoided by using more than three places of decimals, as has been the custom with actuaries and others who have used the common tables of decimals for the purposes for which Mr. Babbage recommended the decimal coinage; but the advocates of this system restrict all their tables to three places only, discarding all lower decimals, which on small sums make an important per-centage.	enables the accounts kept by it to be balanced with accounts kept by the present English coinage, or by any foreign system of currency. Indeed it presents the most perfect decimal (or, if Mr. De Morgan prefers it, *all ten*) system of coinage and accounts.
14. It must be suddenly introduced by Act of Parliament and Proclamation, and cannot be used concurrently with our present system, as the small coins of the proposed and present system will not work together without creating great confusion and loss, producing general distrust.	It may be used concurrently with the present system, as the coins all work perfectly together, and may be gradually introduced as found advantageous.

This statement makes it quite clear, that there is no difficulty in the way of having a simple system of decimal coinage and accounts, without any compulsory change whatever,—individuals being allowed to present their accounts either in tenpences or in the £ *s. d.* as at present. I believe there is no disinclination on the part of the Government to allow this experiment, which has been recommended by the leading commercial journal (see *Times*, April 21 and Sept. 20). On the other hand, the Government, having before their minds the public excitement at Athens in the time of Aristophanes, and at Dublin in the time of Swift, when only a slight alteration in the coinage was undertaken, and being aware of the numerous legislative changes required "to adjust" the taxes, tolls, wages, outstanding bills, and promissory notes, &c., to the altered coinage, to the debasement of the standard, to the depreciation of the copper coinage, and consequent confiscation of private property,—will not willingly incur the responsibility of proposing the extraordinary and, I may say, unjust changes which the system recommended by the late Parliamentary Committee involves; which are wholly dependent on the assumption that the pound *must* be retained as the unit, on the erroneous idea that it is beneficial for the richer commercial classes; no other nation in the world, using a decimal system, having a unit of one-fourth that amount.

Under these circumstances it is clear that the prejudice or sentiment in favour of the pound at all cost, fostered by the one-sided Report of the Committee, and the proceedings of the "Decimal Association" of Merchants, now avowedly founded for the purpose of coercing the Government into adopting the Committee's scheme, is the chief and indeed only reason why we cannot immediately have the advantage of this so-much-desired change in our coinage, which promises to be so advantageous to our commerce, and to give *such facilities towards the education of the people.*

I consider the *keeping the penny intact* as absolutely necessary for the interest of the poor and of all those interested in household economy; at the same time the penny affords the merchant the *only means* of keeping his accounts in a decimal system with the accuracy which is so essential to commercial credit; the using it as the basis of a decimal calculation gives him easier means, without any alteration of his present system, of calculating interest, exchanges, averages and profits, and increased facility for carrying on commerce with other countries using a decimal currency; and thus it appears that the interest of the poor, the housekeeper, and the "merchant prince" *is identical* in advocating the penny scheme. Under these circumstances it is surely not necessary for the Government, as required by the Association, to use "a slight exertion of *arbitrary power*" to bring the question to a satisfactory settlement.

P.S. The late Mr. Laurie, the author of "Universal Exchange Tables" and several other commercial works, the only witness before the late Parliamentary Committee practically and commercially acquainted with the decimal system,—whom they employed to prepare tables on their plan, which occupy several pages of the folio report, after having calculated the tables, when he was examined a second time,—ventured to suggest as the result of the experience he had thereby acquired, that a smaller unit than a *pound* would be more useful; and shortly after the publication of the report he was so convinced of the advantages of the tenpenny unit, which I had suggested to the Committee, but which they did not publish,

* This can easily be established by comparing the results of the various calculations cited as examples by the Committee, with the table of decimals of a pound sterling, printed at p. 64 of the report. Mr. Franklin appears well aware of this, for he gives a perfectly correct table of the equivalents of mils and pence, but it is made so by discarding decimals and adopting vulgar fractions, showing that by decimals it could only have been an approximation.—*Report*, p. 141.

The advocates of the mil system make light of this objection, stating that it will only be sensible during the transition period, and that when the system is firmly established and used by all persons (if this ever should be the case) the errors will disappear, or at least be no longer felt. But they forget that merchants who have commercial transactions with other countries, where the mil system is not in use, will find that there is always a difference between their accounts and those rendered by their English correspondents, and *vice versâ*; and therefore to them this inaccuracy will be a permanent evil, and one scarcely to be borne by a commercial country like England.

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that he advertised a work, to be entitled "Decimals Deciphered; being decimal monies of account, and coins of circulation, explained; showing, that if the recommendation of the select Committee of the House of Commons be adopted, dividing the pound into 1,000 mils, the prices of every kind of merchandise now charged by shillings, pence, and farthings, will be changed, and only in a very small proportion will equivalents be obtained by the decimal pound; besides, taxes, parish rates, mileages, and other fiscal assesments, *would be disturbed; hence innumerable grievances would arise:* and showing that by dividing the pound *into coins of* 10*d.* (being founded upon the penny), *a perfect decimal system is obtained, and precise equivalents* for every coin of sterling money. This division affords more advantages than any other that can be suggested. Also showing, that by dividing the pound into coins of 4*s.* 2*d.*, 2*s.* 1*d.* and 1*s.* 8*d.*, perfect decimal systems are obtained, and precise equivalents for every coin of sterling money: with tables of merchandise per yard, piece, &c., produce per cwt. by sterling, and equivalents in tenpennies, income tax, universal profits, &c. &c.; to which is added pounds, shillings, pence and farthings, reduced into twenty-eight of the principal countries of the world, the division of their monies, and value in decimals of the pound; also one million of the integers of each, in sterling, &c. &c."

"*No division of the pound affords so many advantages as this, both for monies of account and coins of circulation.*

"1st. It gives precise equivalents for all coins of sterling money, in tenpennies, and the reverse, not one of which need be withdrawn, but only require to be placed, like prices of merchandise, wages, rents, tolls, taxes, &c., in decimal numeration; *thus neither public nor private interests would suffer by the change.*

"2nd. It would meet the requirements of the wholesale trade, by simple fractions instead of the minute divisions of the penny, now indispensable, from the infinite variety of prices, namely $\frac{1}{8}d. = 1\frac{1}{4}$ cent, a fraction less than 3*d.* per cwt. $= \frac{1}{4}$ cent per lb.; thus in professions, and every branch of trade, calculations would be immensely simplified and facilitated, Customs and Excise duties collected, and time and labour saved in the Post Office, and other departments of the State.

"3rd. It would place our currency in harmony with the monies of those countries which have adopted a decimal division,—France, Holland, Russia, Italy, America, &c., all of which have their integers divided into 100 parts, two columns of figures in books and accounts, and two figures in the fractions.

"4th. The exchange of foreign monies would be obtained by tenpennies, and the reverse which cannot be done by the pound, in consequence of its very great value, as compared with the coins of account of other nations. France gives $25 \cdot 22\frac{1}{2}$ francs for £1; $= 1 \cdot 05\frac{1}{8}$ franc for a tenpenny, and $95\frac{1}{8}$ cents of a tenpenny for a franc. Holland gives 12 florins for £1; = 50 cents of a florin for a tenpenny, and two tenpennies for a florin. The effect is reciprocal.

"5th. *No new coin would at first be required except the cent,* about the value of the centime of France, and smallest coin of many other countries; which proves so beneficial to their poor. The poor of our country would have great cause to rejoice in having such a coin, *as they now suffer wrong in so many of their dealings.*"

Mr. Laurie, a few days before his death, published "A Practical Analysis of the comparative merits of the One Pound, and Tenpence, as the ruling integer of a Decimal Currency for the United Kingdom," in which he further illustrated all the foregoing positions, and added some new arguments from commercial experience.

We cannot have a stronger proof of the commercial value of the penny system.

359. (*Lord Overstone.*) I presume you consider coins to be instruments formed for the purpose of facilitating the adjustment of retail transactions among the community at large?—Undoubtedly.

360. That is to say, they are instruments to facilitate the processes of paying and receiving for small quantities?—Yes; I have already so stated my opinion. For larger sums other means, such as cheques, bills, &c., are generally used, and are more convenient.

361. Does it come within your experience, or the observations which you have heard made by others, that our existing coins are in any respect deficient in convenience for the general purposes of paying and receiving?—Certainly not; I never heard any complaint. I should say that, comparing those with the coins of any other country, they offer the greatest facilities.

362. You do not think that any practical difficulties are now experienced which would justify the attempt to alter the existing system of coinage for the purpose of remedying those inconveniences?—I feel that there is no reason for it, and never have been able to understand how any agitation of the subject could have arisen, for go where I will I hear every body say, "I hope it will not be introduced in our time;" that is the general feeling. Women, especially, as a body deprecate any change, foreseeing the inconvenience it must occasion them in their daily transactions, on whom the current outlay of almost every household in the kingdom depends. The following is a list of the articles exhibited in a mercer's window, High-street, Islington, Tuesday, May 13th 1856, with the prices in our present coinage, and how they will be marked should the pound and mil system come

into use; I can well conceive the feeling of the lady customers on seeing the goods so marked. *Dr. J. E. Gray.*

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Article.	Price. s.	d.	Price under New Coinage. fl.	c.	m.
A shawl	17	6	8	7	5 or ·875
Do.	18	6	9	2	5 „ ·925
Do.	19	6	9	7	5 „ ·975
A mantle	14		7	3	7 „ ·737
Do.	7	9	3	8	7 „ ·387
A shawl	8	9	4	3	7 „ ·437
A mantle	9	6	4	7	5 „ ·475
Do.	13	9	6	8	7 „ ·687
A shawl	12	9	6	3	7 „ ·637
Do.	11	6	5	7	5 „ ·575
A mantle	9	6	4	7	5 „ ·475
A parasol	2	9½	1	3	9 „ ·139
Do.	9	6	4	7	5 „ ·475
Do.	3	6	1	7	5 „ ·175
Do.	2	11	1	4	5 „ ·145
Do.	3	11	1	9	5 „ ·195
Do.	5	11	2	9	5 „ ·295
Do.	4	11	2	4	5 „ ·245
Do.	6	11	3	4	5 „ ·345
Do.	5	9	2	8	7 „ ·287
Do.	2	3½	1	1	4 „ ·114
Do.	5	6	2	7	5 „ ·275
Do.	3	9	1	8	7 „ ·187
Silk dress p.yd	3	6½	1	8	9 „ ·189
Coburg „	0	8¾	0	3	6 „ ·036

Article	Price. £	s.	d.	Price under New Coinage. fl.	c.	m.
Silk dress, p. yd.	0	0	9¾	0	4	0 „ ·040
Do. „	0	1	0¾	0	5	3 „ ·053
Lawn „	0	1	0	0	5	0 „ ·050
Robe „	0	0	6¾	0	2	8 „ ·028
Do. „	0	0	7¾	0	3	2 „ ·032
Do. p. dress	0	8	11	4	4	5 „ ·445
Silk „	1	18	6	£1	9	2 5 £1·925
Robe „	0	5	11	2	9	5 „ ·295
Do.	0	4	9	2	3	7 „ ·237
Do.	0	6	11	3	4	5 „ ·345
Do.	0	6	9	3	3	7 „ ·337
Do.	0	7	6	3	7	5 „ 375
Ribbon, per yd.	0	1	2¾	0	6	1 „ ·061
Do. „	0	0	9¾	0	4	0 „ ·040
Do. „	0	1	0¾	0	5	3 „ ·053
Do. „	0	1	0½	0	5	2 „ ·052
Do. „	0	0	10½	0	4	3 „ ·043
Do. „	0	0	6¾	0	2	8 „ ·028
Do. „	0	0	7¾	0	3	2 „ ·032
Do. „	0	0	8¾	0	3	6 „ ·036
Do. „	0	0	5¾	0	2	3 „ ·023
Do. „	0	0	2¾	0	1	1 „ ·011
Do. „	0	0	10¾	0	4	2 „ ·042
Do. „	0	0	4¾	0	1	9 „ ·019
Feathers, each	0	1	6	0	7	5 „ ·075

Mr. Miller (Journ. Soc. Arts, 5 May 1854), declares "the penny system annihilates everything else but the penny. The pound, the shilling, and the farthing are nowhere visible, nor any of their combinations as represented in the coins; besides, the number required would render it intolerable." He might with more justice have observed, that the pound and mil system, as proved by the preceding list, does annihilate everything else, but the pound. The shilling, the penny, and the farthing are nowhere visible, nor any of their combinations as represented in coins, except the florin; and as to the number of figures, in the very case which he has specially selected for illustration, there is only a difference of two figures; and if his type had had another penny there would only have been one, (viz.: 900 9 9¼=216,117·25), but generally the penny requires fewer figures.

363. If any alteration takes place in the existing system of coinage, it must be for the purpose, not of facilitating the adjustment of transactions, but for the purpose of rendering account keeping more convenient?—Undoubtedly, for no other reason; and I feel satisfied that it would fail even in this respect.

364. Do you think that it is either a reasonable or scientific process to modify our coins for the purpose of facilitating our accounts, or to modify our accounts in conformity with our existing coins?—I see no reason for any change, nor do I think it desirable in any form.

365. Coins you consider to be the fractional parts into which the integer of account is broken for the purpose of facilitating retail transactions?—Yes.

366. Is it not, therefore, desirable that those coins should be susceptible of division into the greatest number of clear and clean parts?—Undoubtedly; that is the advantage of our system, that it does afford you the means of dividing evenly into so many parts—many more parts than the decimal coinage ever can

367. For the purpose of obtaining that result, is it not necessary to take as the basis of our coinage that number which is capable of being divided into the greatest number of clean parts without fractions?—Undoubtedly.

368. Bearing that principle in view, which number do you conceive best answers to that, the number 12 or the number 10?—12, undoubtedly. You can divide it by so many divisors.

369. The number 10 and the number 12 are equally divisible into their own separate units or by the number two?—Yes.

370. But beyond that the number 10 is not divisible by 3, 4, 6?—No.

371. But the number 12 is?—Yes. That is one of the great advantages. In countries which have a decimal coinage they always measure prices by tens and fives; sometimes, indeed, the five is halved, as in 2½ centimes. I never saw an account stated in any other number of centimes; you may have it in a merchant's bill, but in common bills you have no other subdivision than a half and a quarter of the decime or second coin, and the quarter being 2½, and so marked, is a vulgar and not a decimal fraction.

372. Do not you consider the shilling and the penny to be the great coins of account, according to the habits of the lower classes of the people?—I do consider them to be really

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their great coins of account. When we consider that the wages of nine-tenths of the population are far below a sovereign per week, how can it be possible to regard the pound as an important measure to them? nearly everything they buy is bought at prices fixed by the penny,—bread, meat, potatoes, sugar, calico, and a variety of articles, are bought by the penny—the penny is their fixed unit and that of the enormous majority, far more than nine-tenths of the population. With our present coins the price of meat, bread, and other necessaries of life increase in price by a halfpenny or even by farthings, but if the pound and mil scheme were to come into use, the increase would be from 20 to 25 mils and so on, every alteration in prices being equal at least to nearly five farthings and often to ten.

373. You would consider it a great objection to any alteration in the system of our coinage if it should disturb in any respect the value of the penny?—Undoubtedly. My strong feeling on that point was what made me take an interest in the question. I do feel that it would be so great a hardship upon the people that I consider it my duty to do my best to save them from what I believe to be a great and uncalled-for infliction of hardship upon those who are least able to bear it.

374. With regard to the point next in importance to preserving the unaltered value of the penny, do you not consider that the preservation of the shilling, with the greatest facility of subdivision, is of the next degree of importance to the public interests of the lower classes?—Undoubtedly; as the penny is the basis of all the trade of the retail traders, of household affairs, and especially of those of the poorer, and therefore the largest class of the community, so the shilling (which according to the pound and mil scheme is no longer to be a coin of account and to be called a *half florin*) is the most important coin, indeed it may be said to be the unit of the commercial classes and wholesale dealers, of ship-insurance brokers and stockbrokers. All the more important articles, especially those of general consumption, such as corn, flour, sugar, tallow, meal, butter, hemp, oil, resin, coals, salt, &c., are sold wholesale at so many shillings per quarter, sack, cwt. or ton, as may be seen by consulting any price-current. The insurance brokers take all risks at so many shillings per cent. (at least up to 100 shillings or 5*l.*), and facts like these prove most distinctly that it is a great mistake to consider the pound as the unit of general commerce. In the same manner the price of thefunds, shares, &c., is always denoted on the Stock Exchange as pounds, and halves, quarters and eighths of a pound, the two latter coins unknown to the decimal series; and this fact proves that the sgnatures of the chairmen of the Stock Exchange and of Lloyd's to the city petition are to be regarded only as the individual signature of those gentlemen, and not as representing the feeling of the members of those institutions; and the same thing may be further proved by the summoning of almost any of the members of those bodies, the great majority of whom are, I have the strongest reason to believe, opposed to any change.

375. Applying the principles tnat we have already alluded to as to the divisibility of 12 and 10 to the divisibility of the shilling, if the shilling is divided into 12 under the present system, contrasted with the divisibility of the shilling into 10 parts under the decimal system, will not the result be that under the decimal system the only division that you will have of the shilling will be half or sixpence, whereas under the present division of the shilling you have, beyond the sixpence, the third part giving 4d., the fourth part giving 3d., the sixth part giving 2d., the eighth part giving 1½d., the twelfth part giving 1d., the sixteenth part giving ¾d., the twenty-fourth part giving ½d., and the forty-eighth part giving ¼d.?—Undoubtedly. And it is to be borne in mind that all those parts bear upon our weights and measures, and the manner in which people buy and sell, and especially on the manner in which the retail traders and people at large count the price of the articles they purchase or sell.

The Rev. Joshua Leavitt, editor of the *Independent* of New York (U.S.), states to the Committee of the Canadian Assembly in April 1855: "I have no doubt of the "superiority of the decimal system for the purposes of accounts. But for all the purposes "of small circulation, in marketing, huckstering, and the like, I am persuaded that a "duodecimal currency, like that of England, or like that which formerly prevailed in the "city of New York, is far preferable. *These small transactions of daily life outnumber "the transactions of commerce almost infinitely*, and it seems impossible to make a decimal "currency as convenient in these as the old currency. One reason is that the decimal "currency admits of only one aliquot division, that is, into halves. The shilling can be "divided into halves, quarters, thirds, sixths, and twelfths, and if it were needed a coin of "the value of two-thirds of a shilling would be found manageable. In all the countless "small transactions which I have referred to, and in which every man is employed many "times every day, this capability of subdivision is of great convenience. We are constantly "buying a half thing, or a quarter, the eighth, the one-third, and so on. If the price is a "dollar, we can make the charge for one-half, for one-quarter, and of one, two, or more "pence, with our decimal currency; but we cannot pay the equal price of one-third, one-sixth "one-eighth, one-twelfth, or any other fractional part. If the price is half a dollar we can "only pay for one-half, one-fifth, or one-tenth. If the price is a quarter dollar we can pay "for no aliquot division whatever. This is a *constant* inconvenience, and can be got along "with in no other way than by disregarding small differences."—p. 48.

376. You feel satisfied then that the present division of the shilling into 12 pence give facilities for breaking it into the fractional parts required for the convenience of the lowers classes, far more varied and far more extensive than can be obtained by turning it into ten parts or cents?—Undoubtedly.

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377. You think, do you not, that this division of the shilling has this further advantage and convenience, from the harmony which exists between that division of the shilling and the existing system of weights and measures in this country?—Undoubtedly. It appears to me that if you were to change the one without changing the other you would inflict great hardship, even if the advantages of the new system were equal to those of the old one; but they are not equal, but on the contrary greatly inferior.

378. You are of opinion, therefore, in addition to the general scientific and practical objections which exist to the adoption of decimals in opposition to the present system of coins, a further and very formidable objection arises from the existing state of our weights and measures; and that if the decimal system of coinage be introduced, it would go far to necessitate our grappling with the difficulty of a change in the system of weights and measures?—Undoubtedly; I think nearly every writer on the subject, even those who advocate the pound and mil system, speaks of it in that form—Mr. Watts, Mr. H. Godwin, General Pasley, Sir John Herschell, Mr. Maslin, Mr. Jessop, &c., &c., as well as those who advocate other systems, as Mr. Slater, and this greatly adds to the difficulty. Sir John Herschel observes, "Although I consider the advantages of the decimal coinage as "very great, I should not appreciate it with the same intensity, except in the belief "that it would be accompanied by a decimal system of weights and measures." Even the "Decimal Association" seem to anticipate that such a change is to be made. In a circular, signed "J. J. Travers," dated 15th March 1856, it is stated, "In due course the "reformation of our weights and measures upon the same simple basis will be prosecuted "with all the energy it deserves." Let me add that in the circular Mr. Travers seems to consider the *coinage question as settled*, for it proceeds as follows,—"It is understood the "present commissioners consider that the report of the previous commission, the discussion "of the parliamentary committee, and the vote of the House of Commons, *have settled that* "*the pound shall remain as the unit*, and that our coinage shall be decimalized from the "pound downwards." I do not find that the public cails for these changes. I do not know what party is to gain by the change. I do feel, as Mr. Gurney said, that it is not even as if the decimal coinage were equal to our coinage, but to induce us to make a change it ought to be far superior. In reference, however, to these changes, and the supposed necessity for them, I will read to the Commissioners a few extracts that I have made:—

Mr. De Morgan observes that "with the present money the hundredweight of 112 lbs. has some advantages, though 120 would do better; $2\frac{1}{7}$ times the price of 1 cwt. in pounds sterling is the price of 1 lb. in pence; thus, 7*l.* a cwt. is 15*d.* a pound; and, further, the Stock Exchange measures by eighths because half-a-crown is handy."—*Rep. Stand.*, 60.

Mr. Gilbert, formerly President of the Royal Society, and a great advocate for uniformity in weights and measures, says, "Admirable as is the decimal division for all matters of calculation, the binary is the one suited to the common affairs of life, witness the yard, the half-yard, the quarter-yard, the nail; and even at the Stock Exchange the prices of stock are counted in $\frac{1}{8}$, $\frac{1}{4}$ $\frac{1}{2}$, $\frac{5}{8}$, &c."—*Rep. Stand.* 60.

Mr. Bate says, "Numerically speaking, nothing can be more simple or effective in its operation with the more intelligent classes of the community than decimal division; but it would require a careful and lengthened legislative interference to induce the commonalty to conform to units of 10 or 100, instead of the present half or quarter of a pound; the same as to ounces, or to the cwt. Ladies would still insist on buying silk or such articles by the yard, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, or $\frac{1}{16}$."—*Rep. Stand.*, 58.

Mr. De Grave, the scale-maker, says, "I consider the division of the pound into halves quarters, &c., better than any other. Generally speaking, decimals may be best for scientific experiment, but very inconvenient for practical purposes. I also consider the present division of measures better than any that could be devised."—*Rep. Stand.* 60.

Mr. Jessop, a strong advocate for the pound and mil system, very properly observes, "In the introduction of the decimal system into practical use, the new coinages ought certainly not to issue before the new measures; either they should issue together, or the new measures should precede the new coins. The reason is obvious; the old measures could be superseded by the new in one day, whereas it would be many years before the old coins had given place to the new. Besides, to accommodate the new measures to the old coins would involve much less trouble and difficulty, than to accommodate the *new coins* to the old measures, and the old coins would sooner retire in the former case than the old measures in the latter.—*p. vii.* But in all attempts of the kind we should recollect that our object is *uniformity*. Then before you change any part of our system, such as it is, compare the uniformity you *must* lose with the uniformity that you *may* gain by the alteration: any change whatever in the system of the one which would not be adopted in the other would destroy all the existing uniformity. Precious, indeed, must be the uniformity to be obtained which can compensate for the abandonment of that already existing, so well understood by the mass of the people.

379. Have you paid particular attention to the proposed system of decimalizing our coinage as recommended by the Committee of the House of Commons, commonly called the pound and mil scheme?—I have, and have given my opinion on it in the paper already laid before the Commission.

380. Have you considered in what way that system would probably work?—I do not see how it can possibly be brought into use by the people at large. It may suit such men as actuaries, &c. who have been used to calculate by decimals, and the merchants and

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bankers who keep large accounts, and who do not take notice in accounts of the smaller subdivisions; but with the mass of the people and with the small dealings in which they are engaged, the case is widely different. I may here observe, that the way in which we have hitherto reckoned money has been upwards: 4 farthings make a penny, 12 pence make a shilling, and 20 shillings make a pound; but instead of this, according to the new proposed pound and mil system, we are to begin at the other end, and say, a pound is divided into 10 florins, the florin is divided into 10 cents, and the cent is divided into 10 mils. This is a great objection to the scheme, and I am not alone in feeling it to be so. Mr. Jessop, an advocate of the sovereign and mil scheme, observes, "The inscription "on the new florin 'one-tenth of a pound' is, I believe, a great hindrance to its circulation, "because it *introduces fractions*, and connects them with decimals, whereas decimals ought "always *to be treated as integers*, and ought never to be considered as proceeding by tenths, "but by *tens*. Besides, since multiplification naturally precedes division, it must necessarily "be to every mind the more elementary; every coin therefore should be regarded as arising "by multiplication from the next inferior, and not by division from the next superior. The "whole of the old system is founded on this principle, namely, the multiplication and not divi-"sion of the unit. The crown is called five shillings, and not the one-fourth of a sovereign." This being true as regards the florin or tenth of a pound, what must be the effect when we come to the hundredth or the thousandth of a pound. Only consider the wonderment of a cabman when he is told that his fare is 25 thousandths of a pound instead of sixpence, and apply this to all our small purchases of daily life, which make ninety-nine hundredths of our commercial transactions. Mr. De Morgan, in his notes on Mr. Lowe's speech, observes, after showing that Cocker and Walkinghame count moneys as I have done, viz. 4 farthings=1 penny, 12 pence=1 shilling, 20 shillings 1=pound, proceeds," In all countries and in all sytems of teaching, it is 'there we go up, up, up,' with beginners, and 'here we go down, down, down,' only with *those who understand fractions*, witness the illustrious Cocker and the well-thumbed Walkinghame. Take what system you will, people will look at how many parts make a whole, and not at what fraction one part is to a whole. With old Robert Recorde in 1540, the people of 1800 will 'consyder how manye of that subtyler denomination doo make one of the grosser denomination,"' p. 16.

381. Is it not equally possible that you may reckon upwards, and say that 10 mils make a cent, 10 cents make a florin, and 10 florins make a pound?—This may indeed be done, but then you must consider the mil as a whole number, and consequently abandon the pound as the unit of the system. General Sir Charles Pasley, who was one of the first persons to urge the pound and mil system upon the public, has found the difficulty that I mention so strong, that in a paper which he published in the transactions of the Society of Arts, since his examination before the Committee, he has recommended that you should consider your mil as a whole number; otherwise you must begin, if you want to write down a penny or its nearest equivalent, as four with two noughts before it, for by itself it would make four pounds.

382. Is it not equally the case under our present system, if you write down 4, that it may mean pounds or pence according to the accompaniments which surround it?—That is true with regard to writing one sum simply, but if you put down small sums in an account, when you add up the amount you would not keep the decimal mils in their right place in the column without the noughts to indicate their relation to the pound. The whole value of the 4 depends upon the addition of the dot and the noughts before it.

383. Are you sure that you have sufficiently considered the probable working in that respect? Would not the four monies of account, mils, cents, florins, and pounds range under four separate columns as farthings, pence, and shillings now range?—It would not be so marked, you could not so mark it in accounts; at least that is not the custom in any decimal system of accounts that I know. In France you always put, if you want to indicate 5 centimes, a nought before the 5. I never saw it otherwise, and in France the decimal represents only so many pence, while here the first decimal would represent 2 shillings, the second so many multiples of nearly twopence halfpenny, and the third so many farthings.

384. Do not you think that some confusion and imaginary difficulties arise from the fact of not contemplating the mil as a whole number?—If you contemplate using the mil as a whole number, then the difficulty of the decimal dot and the decimal noughts would not arise, but your sums would be expressed in mils alone.

385. What objection is there to contemplating the mil as a whole number?—Certainly, if this is done, it is no longer the pound and mil scheme, but simply keeping accounts in farthings reduced four per cent. in value, a change which no one is likely to recommend; as you descend much lower in keeping accounts, you require many more figures than under any other system; and if you regard the mil as a whole number, consider the confusion that you will create on the part of the majority of the people in buying the most ordinary articles. They buy, say, a pound of sugar at 4*d.*, instead of that they will have to consider it in the light of 16 or 17 mils, and it would be very difficult to calculate, say 9½ lbs. of beef at the rate of 33 or 34 mils instead of 8*d.* per pound, multiplying those mils being evidently so much more difficult than multiplying a much smaller number of pence. You will have therefore in every petty transaction of life an increased number of figures, from the increased complication introduced by this absurd system; and mental

calculation which is now universally applied to such purchases will be rendered impossible. I believe, however, that this will be the only way in which the pound and mil system can be at all comprehended by the people.

386. You think that the representation of all fractional sums of a pound in the form of mils, cents, and florins, would be more inconvenient than the representation of them at present in the form of pence or shillings?—Certainly; for the reasons I have given and specifically stated in the written statement I have presented.

387. Have you observed that a great difference exists in principle between the decimal coinages which exist in other countries of the world, and that decimal coinage which would be introduced into this country?—Yes.

388. Will you explain in what you consider that essential difference to consist?—In all the countries of the world where the decimal coinage has existed they have always taken a small unit, that is to say, the American dollar is the highest unit, worth about 4*s.* 2*d.* or 50 pence, and next to that the highest unit that I know is the Dutch florin, worth about 1*s.* 8*d.*, then the franc and its varieties, worth about 10*d.* English. Thus almost all the decimal coinages I am acquainted with take ten or a near approximation of ten of our pence as a unit or a multiple of that sum.

389. Is not it a fact that in all other decimal coinages the stages between the lowest money of account and the highest money of account are 100?—Undoubtedly.

390. Whereas, in our proposed decimal coinage, the stages between the lowest unit and the highest will be 1,000?—Yes; this is a great evil. I may state that in America the mil was proposed to perfect the system in the mathematicians' eyes, but was never brought into use. Indeed, wherever the millesimal division has been attempted it has never come into use, from its great practical inconvenience; but in the proposed system it would be forced into operation, as the *cent* would be far too large a coin for smaller trade. Let me add, when speaking of mils, &c., that the names usually given to decimal coins are also very inconvenient. Several persons have pointed out this evil. Mr. Leavitt well observes: "The American decimal currency is denominated by words expressive of the relative "value of the different pieces to the one which is taken as the regulating unit, but it "should be remembered that numbers are not names. No man calls his children one, "two, or three; the shepherd names his sheep, the hunter his dogs, and the little boy his "chickens: it is a great convenience and satisfaction that our small coin should have names "of their own."—p. 48.

Cents are of many different values; the proposed English cent is nearly 2½*d.*; the American cent is a halfpenny; that the English public are partly acquainted with the latter term, as many cheap works published for circulation in this country and America are marked, price "1*s.* or 25 cents," meaning thereby American cents. The cent of France, on the other hand, is the fifth of a halfpenny; and so on *ad infinitum.*

391. In all existing decimal systems of coinage there is no intermediate money of account in use between the highest and the lowest. Do you think it would be possible to work our proposed decimal system of coinage without the introduction of an intermediate money of account between the mil and the pound?—I think not; if the pound is to be the unit you must use the florin, if not the florin and the cent; but I doubt if you could induce the people generally to look at the system otherwise than as so many mils or reduced farthings.

392. If an additional money of account be introduced, between the mil and the pound, will not that introduction of an additional money of account greatly diminish the simplicity, and therefore the facility and the accuracy, of calculation which are supposed to be derived from the existing decimal coinages?—I have always felt it to be so.

393. (*Mr. Hubbard.*) You have stated that the pound and mil scheme is founded on an entirely different system from that pursued in France and other continental countries. In page 9 you say, "The only requisite of a perfect decimal system of coins and accounts is "that the various denominations of money of account should increase by a regular decimal "progression, as that is all that is necessary to enable us to use a simple instead of our "present compound arithmetic." That I take to be a very accurate and close description of the advantage to be gained, namely, that in addition or calculation in decimals the progression is always by tens from one denomination to another; it is a progression by 10 instead of by 12, or by 4, or by 20?—Yes.

394. Will you state in what respect this description ceases to apply to the pound and mil scheme. Does not the progression of the mil to the cent increase by 10, from the cent to the florin by 10, and from the florin to the pound by 10?—Yes; but it is founded on a large unit, and it must in reality be considered as a descending instead of an ascending scheme—a division of a sum into its decimal or rather millesimal parts, rather than a multiplication of a sum by tens, as a decimal system ought to be.

395. I was very much struck with the description of the only requisite of a perfect decimal system, because it appears to me to describe so accurately and so closely the exact state of things contemplated in the pound and mil scheme; namely, the regular progression of one decimal to another; the disadvantage which you see in the creation of a higher unit is one which may exist or not, according to opinion, but one which is not affected by this definition?—Certainly not; that is merely a plain definition of what you may consider a decimal system of coinage; it has nothing to do with the decimal coinage recommended by the Committee of the House of Commons.

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396. This is a definition of a perfect decimal system?—Yes; I do not deny that the pound and mil system is in theory a perfect system of decimal numeration. I only say that it differs from any system that any country has ever attempted to introduce, and I believe it differs in a way that will render it more difficult of introduction than any decimal system which has yet been adopted. I may state further, that the Commissioners will be astonished to hear how imperfect the introduction of the various novel systems has been in countries where we are told they have a perfect decimal system, and where the least changes have been attempted. It is more than 60 years since the decimal system was introduced into France, and Louis Napoleon last year issued a proclamation forbidding people from crying their wares in the streets of Paris by the old system of coinage by sous. I beg to hand to the Commissioners the enclosed, which I printed on the 8th December 1855:—

"Frequent reference has been made by writers on the subject of decimal coinage, to the supposed facility with which a decimal system has been introduced in France, as proving that a decimal system of coinage and accounts might with equal facility be introduced into this country. But it appears to me that those who attempt such a comparison must have had a very imperfect idea of the method of keeping accounts previously in use in France, or they would have recognized, that far from furnishing a case in point as regards England, the circumstances of the two countries in relation to coinage and accounts, and the degrees of facility of converting the old into the new, are so entirely different as to afford grounds of contrast rather than of comparison.

"At the close of the last century accounts were kept in France in *livres*, (or *francs*, for the latter name was then even frequently used), *sols* or *sous*, and *deniers*, names derived from the *libræ*, *solidi*, and *denarii* of the Romans.

"The *livre*, like the English *pound*, originally represented a pound-weight of silver; of which the *sol* or *sou*, like the English shilling, was the twentieth part; and of this again the *denier*, like the English penny, was the twelfth. But the value of the French livre had gradually deteriorated to so much greater an extent than that of the English pound, that in 1798 the coin of that name was worth no more than about ninepence English; its twentieth part, the sol or sou, in value nearly equal to the English halfpenny, had become the measure of all the smaller business transactions, and the denier existed only in name. The system was first brought into use in France on the 24th of August 1793, when an ordinance was issued 'directing the coinage of small money of a mixture of copper and 'bell metal, to replace the pieces of two sous and of one sous, of six and three deniers, by 'coins called decimes and centimes, and directing the coinage of pieces of one and five 'centimes.' By a law 7th Germinal, an xi., (28th March 1803.) a slight change was made in the weight and fineness of the livre, solely in order to render that coin an exact and even weight of the new alloy: it was directed that a 'franc' should contain 5 grammes of silver of the fineness of nine-tenths; and by this change the value of the franc was increased by about one-eightieth. It was also decreed that this franc should be divided into décimes, or double sous, instead of into twenty sous as before, and that the décime should be divided into 10 centimes. In this new system both the livre and the sous (the actual current coins) remained as before, and bearing the same relation to each other, with the exception of the slight alteration in the intrinsic value of the former; the former under its previously well-known denomination of a *franc*, and the latter retaining in common parlance its popular name of *sou*, but converted in accounts into 5 centimes. Thus the only practical difference consisted in the sou now consisting of 5 centimes, instead of 12 deniers as before the change; but this difference could scarcely have been felt in the ordinary transactions of life, both centimes and deniers being simply moneys of account, and of very trivial importance in the daily traffic of the community.

"Yet small as was this change, it was attended at the time with very considerable difficulties; and even now, at the distance of more than half a century, it is by no means universally adopted in France, either in accounts or still less in the great mass of ordinary retail dealings. As long as the old livres remained in circulation, whenever they were tendered in place of a franc it became a constant source of contention which party was to be the loser by the bargain; one or the other must be so, as there was no coin to represent the actual difference, and the debate frequently ended in the weaker party giving two centimes or one-fiftieth part of the value (instead of one-eightieth) over and above the livre; or, as a centime was a rarity seldom seen, a livre and a sou were combined to represent a franc, and thus the receiver obtained $3\frac{3}{4}$ per cent. beyond the real value of the new coin as compared with the old. Even to this day, although in Paris and other large towns written accounts are kept in francs and centimes, (for this décime is universally neglected,) this is by no means uniformly the case in the provinces, where accounts are still frequently kept and presented in livres, sols, and deniers, as of old; of the existence of which custom I have proofs in bills in my own possession. And in Paris itself, as well as everywhere else throughout France, the prices of most of the common and smaller articles are still constantly expressed in sous; as must be well known to every Englishman who has visited France. For those who have not, it will be sufficient to quote the striking fact, that the universally read *Galignani's Messenger* is marked—not half-a franc, not 5 décimes, not 50 centimes, but—'price 10 sous;' and to call their attention to an ordinance of the present year prohibiting the crying of articles in the streets by the sou. So difficult is it to change the habits of a people, even where the change involves no real or practical difference.

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"When the Assemblée Générale in 1790 referred the question of alloy, together with the system of weights, measures, and coinage, to the Academy, the commissioners named by that body in their report upon these subjects recommended the universal adoption of a decimal system, on the sole ground that the decimal scale formed the basis of the common arithmetic; allowing, at the same time, that for practical purposes the decimal is much inferior to the duodecimal. They feared, however, to recommend so grand an innovation as would have been involved in the substitution of the duodecimal scale in arithmetical calculations; although it must be admitted by all candid inquirers that this superiority of the duodecimal scale is a strong argument in favour of those who are opposed to the change of our present system of coinage and accounts, of which the duodecimal element forms so essential a part. It should be observed, however, that not only was the *denier* in the older French system the twelfth part of a sou, but that even after the change several of the older coins having duodecimal values were for a long time retained; such as the coins of three or six livres, which were decreed on the 12th September 1810 to be worth respectively 2f. 55c. and 5f. 80c., silver coins of 6, 12, and 24 sous, which were decreed on the 10th August in the same year to be worth respectively 25 centimes, 50 centimes, and 1 franc, and gold coins of 24 and 48 livres. These coins gradually disappeared; but it was only by decrees, of the dates of 10th July 1845 and 20th April 1852, that the last of those coins, which were regarded as incompatible with a complete decimal system, such as the silver coins of 25 and 75 centimes and of 1 franc 50 centimes, were finally withdrawn from circulation. As regards actual circulation, the sou or piece of 5 centimes may almost be regarded as the lowest coin, for the pieces of 2 and 3 centimes directed to be coined by the decree of the 28th March 1803 have never been issued; and the single centime is so rarely to be met with in circulation, that on a visit to France in September of the present year, I observed a quantity of them in a money-changer's window at Boulogne, and in another in Paris, marked 'centimes one penny each.' The only place, I believe, where it is possible (until very lately) to obtain centimes as currency, is the toll-gate of the Pont des Arts; whither the curious resort to obtain a change of four centimes out of their sou, the tariff for crossing the bridge being one centime.

"From the foregoing observations it will be seen, that although the French system of coinage and accounts up to the commencement of the present century was like our own, based upon divisions by 20 and by 12, the latter divisions had for all practical purposes almost wholly disappeared, by the deterioration of the pound to less than a twenty-fifth part of the value of the English; and that the two practical coins of currency, the franc and sou, continue to bear exactly the same relation to each other: and that inasmuch as that relation was exactly 20 to 1, the conversion to a decimal system afforded the greatest possible facilities. And yet we have seen, that with all those advantages, and with all the weight and influence of a centralized government acting constantly and directly upon the remotest districts as completely as upon the capital itself, in neither the one nor the other has half a century sufficed completely to effect so simple a change. If I might be permitted to make a suggestion to the Royal Commissioners to whom the question of a decimal coinage is referred, it would be strongly to urge upon them, before collecting *vivâ voce* evidence upon the subject, to study carefully all the circumstances connected with the change of system in France, in the United States of America, and in other parts of the world, in order that they may be able to appreciate and to correct if necessary the evidence given before them, as it appears to me to have been in a great measure the deficiency of this kind of knowledge in the Parliamentary Committee which has rendered necessary the appointment of a Royal Commission of Inquiry.

In the *Times* of March 18th 1856 is the following notice:—"The *Moniteur* publishes an Imperial decree withdrawing from circulation the old copper coin, namely the pieces of *one liard* and *two liards*, and those of one centime bearing the effigy of Liberty, on the 18th July next; and pieces of *one sou* and *two sous*, and those of five and ten centimes bearing the effigy of Liberty, on the 1st October following. Until then these coins will be received in payment of duties and public taxes, or exchanged for other coins in the Government offices"—showing that the non-decimal coins still hold their ground after more than 60 years.

M. Dupuit, chief engineer of the city of Paris, observed at a meeting at Paris in September 1855:—"It was found troublesome to reckon *centimes* by the head, and hence the *sou* continued in use."—*Yates, Narrat.* 46.

I have here a series of coins that I obtained myself in Calais, in change for a half franc, as I came back from Paris last summer, showing that the old series of coins are still in existence, such as half sous and liards. In many parts of France they still keep their accounts in *livres*, *sols*, and *deniers*. I only point this out to show the difficulty of introducing a new system. It is the same in America:—

The Rev. Joshua Leavitt, of New York, states:—"You are aware that in our (that is, "New York) marketing and other small transactions our business is still done in shillings "and pence, the shilling being one eighth of a dollar, and therefore corresponding exactly "in its value to the old Spanish coin of one-eight. The provincial currency of New York "before the revolution was framed upon the reckoning of eight shillings to a dollar, and "when the federal currency was introduced in matters of coin, the common people still "clung to the old shilling as a matter of necessary convenience in their pocket payments; "and the experience of *sixty years* has not in the least diminished their attachment to this

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"method of reckoning in small payments." * * * "And not only this, but we find "the people of all parts of the country are learning more and more to use the vernacular "currency of New York in their daily chaffering from one end of the United States to "the other. You will frequently hear people giving you the price of things in York "shillings and York sixpences. I think this experiment is conclusive, and ought to be "satisfactory to prove that the duodecimal currency in small transactions is a great public "convenience. I am sure it is only this actual and felt convenience which has enabled it "to maintain its ground for 60 years." * * * "For myself I have no idea that we "shall ever abandon the shilling currency; the lapse of generations has only fixed it more "firmly on us, and I fully believe that in a few years we shall have a Congress so governed "by common sense, and so alive to the convenience and welfare of the people, that they "will legalize the York shilling and sixpence as the eighth and sixteenth of a dollar, and "will give us from their own mint a corresponding coinage," p. 48. The Committee of the Legislative Assembly of Canada for 1855, after giving an abstract of Mr. Leavitt's evidence, report:—"Your Committee are of opinion that coins representing the eighth "and sixteenth of a dollar are indispensable in small transactions in Canada, and that the "small British sixpences will continue to pass extensively as the eighth of a dollar, unless "a better coinage is provided," p. 14. These coins, it is to be remembered, form no part of a decimal system, but are repugnant to it.

So also M. Cogels, a Belgian senator, gave, in September 1855, as an instance of the difficulties which the metrical system has had to overcome, what has occurred and is still passing in Belgium. "The system was introduced into this country (Belgium) by the "French Republic. It has been maintained by the Dutch Belgian Government, and by the "revolution in 1830, and notwithstanding this perseverance, there are still difficulties to "surmount."—*Yates, Narrat.* 45. That is after more than half a century.

397. (*Chairman.*) That old system which you have described of the French coinage, antecedent to the introduction of the decimal system, bore a very close resemblance, did it not, to the British coinage as it now exists?—It was in its origin the same thing, but by the depreciation of the coinage had become widely different. There existed in most countries of Europe while under the Roman dominion, and was afterwards retained—a system exactly similar in its divisions to that which we now have in use. For example, the same mode of subdivision prevailed in Scotland, in France, in Turin, Geneva, Genoa, Leghorn, Milan, Rome, Alicant, Valencia, Barcelona, Amsterdam, Hamburgh, and many other places. But in course of time the coinage of most of these countries and places had become so debased and depreciated in value, that a change had become absolutely necessary, as the lower coins were too minute in value for any useful purpose. For example, in France the *livre*, which originally represented one sovereign or pound, was reduced in value to less than 10*d.*, and its 240th part was consequently worth less than the 24th of a penny. It became therefore necessary to put an end to this mischievous state of things, and the change made by the French National Assembly was very simple, and apparently very easy. They transformed the two sous piece, which originally represented two of our shillings, into a décime, and representing the tenth part of the whole *livre* or *pound*, which, in pursuance of the system of changing the names of everything, they called a franc. By adding a further subdivision into *centimes*, they formed a decimal system; but with all this apparent facility, after a lapse of 60 years, you still never hear the word "décime" used; it is never used in conversation; they speak of 10 centimes, but they do not speak of a décime at all so that their system is really centesimal, and not decimal.

398. In many of those countries which you have named very correctly, as having been originally the seat of a system of coinage closely resembling our own, there has been subsequently introduced the decimal system?—Yes; but almost solely as the result of great confusion or depreciation of the currency, affording motives and facilities for such changes.

399. Practically speaking, that has been so?—Yes; and I may add that in most cases the changes has been introduced by force of arms, as I have before shown, or after some great revolution which had disposed men's minds for changes.

400. Can you mention any instance in which the decimal system, having been introduced and made the legal system of the country, has been abandoned, and the system of allowing the use of the principles incident to our system has been introduced and adopted in preference?—The decimal system of France was introduced in various parts of the continent, as I have already stated, by Napoleon by his conquests, and withdrawn when those countries regained their independence. Thus in Westphalia it was introduced by Joseph Bonaparte, and coins were struck; but afterwards the Westphalian Germans went back to their old coinage, and have never resumed the decimal one. I am aware it has been often stated that no country that ever had a decimal coinage had resumed their old non-decimal system, a statement only to be explained by a want of knowledge of the subject, even as regards Great Britain and its dependencies. The "dollar and cent system" with "a penny" for the 50th part of the dollar, was introduced into Sierra Leone by an English trading company in 1791 (being the first of the more modern decimal coinages), but that coinage has since gone out of use. A complete system of decimal coinage, founded on the decimal multiples of the penny, long existed in Ireland, and was backed by numerous Acts of Parliament, offering the Irish an opportunity to adopt a decimal system of accounts. The Bank of Ireland, urged forward by the great want and the depreciated value

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of the few silver coins in Ireland, under the sanction of several Acts of Parliament (stat. 45 G. III. c. 42., 48 G. III. c. 31., 53 G. III. c. 46., 56 G. III. c. 68.,) issued coins (tokens) of the value of 5, 10, 30, and 60 pence, Irish. These coins were ordered to be received in payment of the public revenue in Ireland, and to prevent these and the tokens of the Bank of England being remelted and coined into the silver tokens issued chiefly in the West of England, about 1816 several acts of Parliament were passed (as 52 G. III. c. 157., 53 G. III. c. 114., 54 G. III. c. 4.,) declaring all other tokens to be illegal; they were even continued as legal tender by the Act 56 G. III. c. 68. at the period of the new silver coinage in 1816, but they were perhaps called in by the proclamation of the 1st of March 1817, though they are not specially mentioned in it, or probably they remained current until the currency of Great Britain and Ireland was assimilated, on the 27th of June 1817. The larger coin of 60 pence is exactly like the Bank of England "five shilling piece or dollar," with a new reverse, Britannia and the inscription being replaced by a figure of Hibernia, "the Bank of Ireland," and "six shillings." The other tokens were inscribed, Bank token, five (10, or xxx) pence Irish. The dates of those I have seen are 1804, 1805, 1808 and 1813. Some of these coins were formerly rarely seen in England, and known as Irish shillings or tenpennies. Though the system was founded on the penny and made no alteration in the value of the current money, yet the people do not appear to have appreciated its advantages, and it has entirely gone out of use, for which I know of no other reason than that it was not found so convenient as the old duodecimal system. In the straits settlements at Singapore, they have for years had a dollar and cent system of coinage and accounts, but they have within the last few months returned to the mixed system of rupees and annas, like the rest of India.

401. (*Lord Overstone.*) You stated, did you not, just now that that was the case in Switzerland?—Yes; and it was also the case in Sardinia; they have oscillated between the two systems, but in Westphalian Germany they went back entirely to the old system, and literally have never returned to the decimal coinage again.

402. (*Mr. Hubbard.*) Passing from the first position which I have mentioned, that the theory of a perfect decimal system is in harmony with the composition of the pound and mil system, your objection is to the elevation of the unit?—Yes.

403. You comment in your work upon that disadvantage, as justifying you in laying down this rule at page 20, that it should be borne in mind that there ought not to be more than two coins of account in a system of this kind. That is of course founded upon the assumption which I think everybody must admit, that you could not work the pound and mil scheme simply with two coins of account?—Yes; evidently.

404. But the reason by which you support that argument at the top of page 21 is this: "It is perhaps not easy to give a better reason for this rule, than the experience of "every country where the decimal system has been introduced." And you there enumerate the countries where the decimal system of coinage does exist, but only with two coins of account; you cannot now perhaps allege any other reason than the fact, that looking at other countries, we do find two coins of account, and two only?—That is to say, I believe that the experience of mankind has shown this to be the case. I would correct a statement at page 22; I find that in China, as in Portugal, they have only one coin of account. In Portugal it is the rei; it is the same in Russia, where they have the kopeck; and in the aboriginal decimal coinages of China, Russia, and Portugal, they all have a very small coin of account, which increases decimally, as the arithmetic progresses; hence it is that they have decimal systems, but it is not a decimal fractional system produced by the division of the unit. The milrei is evidently the accumulation of the rei, and not the unit from which the latter are derived.

405. In each of the countries to which this reference alludes, the unit of value is considerably lower than a pound sterling?—In every country; the highest is that of the United States, 4*s.* 2*d.*, and the lowest the cash of the Chinese, worth about one thirty-second of a penny.

406. So that in point of fact it is owing to the high value of the pound sterling that the necessity for more than two coins of account is inevitable if the decimal system is adopted?—Certainly; but if you consider it absolutely necessary to keep the pound sterling as the unit, I think that the objection to the division of the pound sterling is so great that it would be far better not to attempt to form a decimal system. It appears to me that if you were to keep the pound sterling as the unit you would introduce such a complicated system as would be very difficult indeed to carry into execution; and I cannot conceive for what purpose such a change should be made. The great advocate of the change, and certainly almost the only active writer on that side of the question, Professor De Morgan, in his last edition of his arithmetic, dated 1846, observes in the preface, "The sixth (Appendix) on decimal money should be read and practised by every student with as much attention as any part of the work. The mastery of the rules for instantaneous conversion of the usual fractions of a pound sterling into decimal fractions, gives the possessor the greater part of the advantages which he would derive from the introduction of a decimal coinage;" and, on referring to Appendix six on decimal money, I find that he says, "Of all the simplifications of commercial arithmetic, none is comparable to that of expressing shillings, pence, and farthings, as decimals of a pound; the rules are thereby put almost upon as good a footing as if the country possessed the advantages of a real decimal coinage." "Any fraction of a pound sterling may be decimalized by rules which can

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be made to give the result at once." It is quite clear from these quotations, that even in the opinion of Professor De Morgan you have every desirable facility for making decimal calculations when they are specially required under our present system, without encountering the difficulties necessarily attendant upon so great a change in the habits, thought, and language of everyday life.

407. Have you not the advantage which you yourself state in page 9, that you have a regular decimal progression, which makes the addition in sums stated in decimals so exceedingly simple and easy, and consequently so little liable to errors?—When I wrote my pamphlet I had a much higher estimation of the value of a decimal coinage than I have now. I have since collected all the information that I can upon the subject of decimal coinage, and I have also collected together a large series of illustrative coins. I still adhere to the opinion that if we are to have a decimal coinage it ought to be a very simple one. It was upon that ground alone that I recommended the system which is put forward in my pamphlet. I desire above all things that no change may be made; but if there is to be a change, it is essential to even partial success that it should be the simplest possible, and that it should not alter the value of the penny; and I firmly believe that most persons who would take the same pains as I have done would come to the same conclusion, if they would but patiently wade through and digest the mass of documents which I have collected on the subject, and which I have placed at the disposition of the Commissioners, and which, I think, go far to prove that in every country where the decimal system of coinage has been attempted to be introduced, it has proved a failure, as far as coinage is concerned, and that they have all been obliged to allow of the circulation of non-decimal coins as halves, quarters, sixths, eighths, twelfths, sixteenths, or twentieths; thus, shillings and sixpences are still current in the United States of America, and sous and liards in France, after a period of 50 years, and in spite of all attempts to get rid of them by law. I am willing to allow that with decimal accounts the system has been more successful, but that, if I understand right, is not within the province of the Commission, and is comparatively of trifling importance. I still retain the opinion expressed in my pamphlet: "The Government "have shown no inclination to throw any difficulties in the way; it has even gone the "length of coining and issuing a piece of money which was recommended as facilitating the "system, but which, although coined in large numbers, has never become popular; it has "granted a committee of the House of Commons, which has strongly recommended the "adoption of the plan, and since the committee has reported, there have been several "meetings in Liverpool, Manchester, and some other provincial towns, and in some of the "scientific societies of London, which have passed resolutions and sent a few petitions to "Parliament in support of the general principle. But, certainly, the system with all this "agitation has made no progress with the people, almost all the speakers at these meetings "have been a few of the witnesses before the committee, and of the members of Parliament "who formed the Committee itself; and it appears very probable that the agitation will "die out as it did some forty years ago from the same cause;" p. 21. This was true in 1854, and I believe it is equally true now. The Decimal Association, which had a large list of members, employed active agitators and engaged offices, after publishing a few tracts, which have met with very little notice from the community at large, now dates its circulars, entreating petitions and subscriptions, from a room in the "Gresham Club."

408. You have not yet considered the possible advantage which might ensue from having a decimal progression without the apparent confusion arising from the position of the dot or point, which you think is inseparable from it, counting either from the mil upwards or from the pound downwards, leaving to the dots or points the designation of the value of the figure used; you have not considered florins and cents as you would shillings and pence, as merely items in four denominations?—The disadvantage I consider to be this:—There is no reason why you may not consider them as whole figures, but you introduce more figures and greater complication than at present into the most ordinary calculations, which is not desirable; as well as great confusion in the daily requirements of domestic economy in the ordinary habits of life, for what I do not consider as any advantage. One of the advantages put forward by some of those who advocate the change, such as bankers and men in large mercantile business, is the entire abolition in their books of figures, representing the smallest denomination. You see that put forward in Mr. Miller's evidence, who states as a great advantage that you will have your accounts clear of any copper, but such supposed advantages are all in connection with large accounts of bankers, merchants, &c. What I was referring to are the small sums of money passing from hand to hand in the common transactions of life, which are as 100 to 1 of the large transactions.

409. A lengthened study of the question has made you think less favourably of the decimal principle than you did when you wrote the pamphlet which is intituled "Decimal Coinage"?—Certainly; that is to say, as a coinage of practical use; but at the same time I ought to state, that if any form of a decimal coinage is to be introduced I hold to all the principles in regard to it put forth in that pamphlet.

410. You think less of its advantages and more of its inconveniences?—Yes; after I have read all the evidence put forward with regard to its advantages before the Committee of the House of Commons, and, as I believe, all the books, pamphlets, and letters that have been published on the subject; and I have made it my business to study the subject in the countries where a decimal coinage is in use.

411. (*Lord Overstone.*) I think I understand that your views upon the subject of decimal coinage have undergone some considerable change, and that the result of a more extended inquiry and more patient investigation has rendered you less favourable to the decimal system than you once were?—Undoubtedly.

412. You stated, did you not, that if the decimal system of coinage proposed by the Parliamentary Committee be introduced into this country, it will differ very essentially from any system of decimal coinage which has as yet been adopted by other countries?—Most undoubtedly, and be introduced under entirely different circumstances.

413. I presume that the important points in which the essential difference consists, are, first of all, the high integer of our present system, the pound sterling, the retention of which will necessarily involve many inconveniences and disadvantages in our decimal system. And, secondly, the inconvenience and difficulties which must attend the introduction of a copper coinage which bears no equivalent value in the existing copper coinage?—No doubt those are the principal inconveniences; but there are other very serious ones, which I have put forth in a paper which I printed in 1855, in the *Spectator* newspaper of 4th August 1855, and which I will read:—

"If it is predetermined that the proposed decimal coinage must of necessity start from a large unit, to be decimally subdivided, and the subdivisions used as monies of account, then, indeed, 'the entire question' respecting it may be resolved into the three points as stated by your correspondent 'H.'; but I apprehend there is a preliminary point still to be settled, which he appears to have entirely overlooked, and which is involved in Mr. William Brown's dictum that 'the question is now between the pound and the penny.'

"It is perfectly true that merchants, bankers, actuaries, and others, having large calculations to make of interest, discount, dividends, &c., frequently make use of the decimals of a pound sterling, as they do also of the decimals of a year, a month, a hundredweight, or a ton; but they do this not from any peculiar convenience inherent in those units, but simply from their being the sums and quantities in actual present use, to which their calculations are necessarily adapted. I cannot admit that because it has been the custom of large traders and others under the present system to make use of a certain existing unit, it therefore follows that in the introduction of a new coinage, as part of a complete decimal system for the use of the entire people, we are bound to follow the same plan, especially if it is proved that it is attended in practice with many disadvantages and complexities, which are not to be found in a system commencing with a smaller unit.

"In making so extensive a change in the habits of the entire people, it appears to me that we ought to be most careful to select the most perfect system, the most convenient for practical use, and at the same time that which is likely to be attended with the smallest amount of disturbance, inconvenience, and distrust, to the mass of the community. Among the many disadvantages of the scheme for taking the pound sterling as the unit, and dividing it decimally into tenths, hundredths, and thousandths, as proposed by Mr. William Brown's Committee, the following are some of the most prominent.

"1. It requires three places of decimals for its expression, and consequently demands a larger number of figures than in the present method, or in a system starting from a smaller unit. As Mr. Bevan's clerks justly observed, the second figure of the decimals not descending below a coin representing the value of nearly two-pence halfpenny, it would always be necessary, even in bankers' books, to have recourse to the third figure, instead of rejecting it, as is now done with reference to the column of farthings.

"2. Although three places of decimals may be a sufficient approximation under this system for entries in the ledger, they would be found insufficient even for many of the more common calculations, in which to insure accuracy more places of decimals would be required. There is scarcely an example, among those selected for publication by the Parliamentary Committee, of conversion from the existing system into that proposed in which the result is other than approximate. But as every one of these is capable of a determinate solution by our present mixed system, it surely would be a step backward if we were to adopt in its place a scheme requiring a far greater number of figures to arrive at an exact result, or one which is incapable of attaining it. Actuaries and bankers are so well aware of this imperfection in the scheme, that in calculation of interest, &c., they are not satisfied with the use of fewer than six places of decimals; and in order to remedy it, one of the witnesses, (Mr. J. Franklin, a warm advocate of the Committee's scheme,) in a table, part of which is given in evidence before the Committee, actually adds a vulgar fraction after the three figures of decimals, in order accurately to represent the required equivalent,—a singular mode of decimal calculation, and one which can scarcely be recommended as a perfect decimal system.

"3. As we have no coins in present use representing the 10th, 100th, or 1,000th part of a pound sterling, it would be necessary to introduce an entirely new series of coins and of names of coins into all our accounts, and in the prices of all articles bought or sold, having no reference to any of the coins or values at present in use; and for the same reason the smaller coins (including all the copper and some of the silver) now in use could not possibly be allowed to circulate together with the new coins, on account of the loss and confusion which must ensue, and which would inevitably create great dissatisfaction and distrust among the less-informed portions of the community, which years would not suffice to remove.

"4. By the decimalization from the pound downwards, the penny, which is at present the almost universal standard of value, as regards rates and taxes, duties, stamps, tolls, wages,

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and the price of nearly every article of daily and universal consumption, is entirely set aside. Such a sweeping change would manifestly introduce great confusion into all retail trade, and require a multitude of legislative enactments for the alteration of the present rates of duty, tolls, &c, to adapt them to the new coinage; all of which would be looked upon by the mass of the community with suspicion and alarm.

"On the other hand, were the penny adopted as the basis of the system, together with its decimal multiples and subdivisions, our system of accounts would be as perfectly and completely decimal as could be obtained by any other mode, and every one of the above important objections would be wholly obviated.

"1. If accounts were kept in tenpences, in large accounts only one, and in smaller dealings at the most two, places of decimals would be required; and it must be evident to all that fewer figures would be required to keep accounts in pence than in farthings or mils.

"2. Under the penny decimal system all sums may be calculated with equal accuracy and with greater facility than under the present mixed system; while the advantages in these respects over the pound and mil scheme are unquestionably greater still.

"3. As the values and names of existing coins would remain unaltered, it could by no possibility introduce the slightest difficulty or confusion into the ordinary transactions of trade, or the calculation of wages; while taxes, tolls, &c., would require no questionable alteration, remaining exactly as they were before.

"4. Such a system may be introduced at any time without the risk of creating dissatisfaction or distrust, inasmuch as the decimals and the mixed system may be used simultaneously side by side with perfect agreement; and it would thus be left, as it ought to be left, to the practical good sense of the people to determine which of the two they would adopt. It is most probable that although accounts would be kept in decimals, the great bulk of the community would prefer for daily barter the existing duodecimal silver coins; which would be as readily reckoned into the decimal system of accounts as the similar coins which form the currency of Portugal in connexion with the complete decimal system of accounts of that kingdom. This preference can, however, only be determined by experience; but under such a system there would, at all events, be no necessity for the withdrawal of any part of our present coins, until the necessities of the coinage rendered it desirable on other grounds. The shilling, the half-crown, and the crown, would still continue to represent 12, 30, and 60 pence, and the practice of purchasing articles by the dozen and the half-dozen, and of subdividing by halves and by quarters, is too strongly rooted in the habits of the people, and too practically useful, to allow of the abandonment of threepenny, fourpenny, and sixpenny pieces. It is too much to expect that the present generation should all at once consent to relinquish the advantages which they naturally enough believe themselves to possess in the system of mental calculation now so universally taught in schools, and which is more or less engrained into the daily and hourly practice of even the poorest and least educated among us.

"As the chief advantage of the pound and mil scheme is the retention of the pound sterling as the unit of account, so the chief objection to the penny and tenpenny system is that the pound would cease to be a money of account, being no regular decimal multiple of tenpence. Its conversion, however, would be effected in the simplest possible manner, inasmuch as it is a regular multiple of that proposed coin by 24, as the guinea (altered as proposed by your correspondent 'H.') would be by 25. As four such guineas would exactly represent 100 tenpences, and gold pieces of the higher value of five sovereigns have already been coined, although not put into circulation, I know of no reason why a coin of that value might not have existence and a name, and, in fact, be the golden basis of the system.

"It appears to me that if we are to have a decimal system of coinage and accounts, some sacrifice must be made to secure its advantages; and the question may be shortly stated thus.

"1. Shall we retain the pound as the unit, divided into 10th, 100th, and 1,000th parts, and thus introduce an entirely new set of coins, with new names and of new values, together with a complicated, and in many cases an inaccurate, system of computation, producing much confusion, and engendering great distrust among the people at large?

"Or, 2. Shall we relinquish the pound as a money of account, retaining all our present coins with the same names and with the same values, together with a perfect decimal system of accounts and a simple and perfectly accurate system of computation, which may be brought into use without any confusion or alteration in the habits of the people at large, who may indifferently use either the present system or the new one, until they become satisfied of the advantages presented by the latter?

"To these observations I would only add the following considerations deduced from experience. The chief arguments in favour of the practical advantages of the decimal system are drawn from its use on the continent and in the United States of America. But all the countries referred to have uniformly avoided the great evil which I have pointed out in the committee's scheme, by choosing a small unit, which for the lowest values would require only two places of decimals. Thus the unit of France, Belgium, and Switzerland, is nearly equivalent to our proposed tenpence; that of Holland to twentypence; and those of Italy, Savoy, the United States of America, Canada, Singapore, &c., to fifty English pence. These all bear approximately a decimal relation to our penny, and the highest among

them very little exceeds in value one-fifth of that of the proposed unit of the scheme recommended by the committee, which consequently derives no support, but on the contrary receives a direct reprobation, from the argument of the experience of other nations. As regards home experience, I may observe that the pound and mil scheme is almost solely recommended by mathematicians, bankers, actuaries, and engineers,—men of high education, familiarized by their position and by their pursuits with the use of decimals extending to any given number of places, and constantly requiring such an extension in their calculations. To these, of course, a scheme requiring only three places of decimals appears mere child's play; but men conversant with the more ordinary calculations of trade (such as the late Mr. Laurie, the compiler of a large number of the most useful practical tables in existence) have, after long-continued trials of the scheme, fairly given it up as too complicated for ordinary purposes, and become warm advocates of the tenpenny system, which they have honestly declared afforded, by means of its small unit, great advantages both in point of accuracy and facility of use. In regard to the unit of a guinea, (of a value equal to a pound and tenpence,) divided into a thousand farthings, as recommended by your correspondent 'H.,' and by Mr. Headlam before the committee, its great advantage (in common with the tenpenny system) consists in its creating no alteration in the value of existing coins, or in that of existing contracts: but it has the insuperable difficulty (in common with the committee's scheme) of requiring an entirely new set of coins of account, with new names and new values. Its advantages are therefore greatly inferior to those offered by the tenpenny system, with which it coincides in the single disadvantage of abolishing the pound sterling as a coin of account.

"I may conclude with an observation attributed to Mr. Rogers, which I believe represents the feeling of a vast majority of the commercial classes, as proved by the little interest they have taken in the question—'I am satisfied with the present money and accounts, and desire no change; but while the agitators confine themselves to the pound and mil plan I have no fear, as that is simply impracticable: if they adopt the tenpenny, then we must look about us.'"

To this I will only add the concluding paragraph of my pamphlet, p. 38.

"This (the penny) system might be brought into use without any confusion, and would only require a very short declaratory act for the purpose. Indeed, any person might keep accounts by it, without such sanction of the Legislature, but for the existence of the law which requires that to establish a legal claim all accounts must be made out in the proper money of accounts, viz., pounds, shillings, and pence. The law need only enforce the following regulations:—

"1. That all accounts shall be kept in tenpences, which may be called albions and pence.

"2. That the gold now coined into sovereigns shall be divided into 24 silver tenpences or albions, each containing ten copper pence.

"3. That all contracts, where the word 'shilling' is mentioned, shall be regarded as implying an *albion* and twopence, or twelve copper pence.

"Perhaps the least objectionable course would be to pass a permissive act for accounts to be kept either in the present manner, or in pence and albions, or by whatever name the tenpenny coin may be designated; the Government coining albions and half albions, leaving the gradual adoption of the decimal system to the convenience and experience of the people, and adopting it themselves in the accounts of the Customs, and elsewhere if found convenient.

"I am aware that the permissive act instead of the obligatory has been strongly objected to by some writers on the subject; but such objection can only be founded in want of faith in the excellence and usefulness of the decimal system which they advocate."

414. Considering the difficulties which you have enumerated you have come to the conclusion that it is inexpedient to make any attempt to introduce the decimal system into the coinage of this country?—Certainly.

415. But suppose that it should be the decision of the Government and of Parliament that the decimal system of coinage shall be introduced into this country, do you think that it would be more desirable to grapple with all those difficulties, for the sake of retaining the pound sterling as the integer of account, or would it be expedient to surrender the pound sterling for the purpose of obviating many of those difficulties, and incurring other difficulties by a change in the integer of account in this country?—You must get rid of the pound sterling as a matter of account if you wish to introduce a practicable decimal coinage. I thoroughly believe that if it were attempted to establish the system on the pound unit it could never be carried into execution; 50 or 100 years would not bring it into use, and the certain experience that we have of the difficulties of change, and of the very long period required to bring the new system into full operation in other countries, confirm me most strongly in the opinion which I have been compelled to form, that those advocates of change in this country, who are continually speaking of it as the affair of a day, and as being effected "once for all," are very unsafe guides in a matter of such extreme difficulty and such universal importance.

416. In case the decimal coinage be introduced into this country, you are of opinion that the pound sterling must be abandoned and some lower integer must be taken?—Certainly. I look upon that as conformable to the experience of all countries.

417. What integer ought to be taken, do you think?—I do not recommend the abolition of the pound, as I do not wish that any change should be made in our present system; but I consider the getting rid of the pound as a coin of account as of much less importance than

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the alteration of the penny and of all our smaller coins, as it is only the richer and more instructed part of the community who use pounds; and many commercial countries, indeed I may say all countries but our own, and many parts of our own dominions, such as the East and West Indies, appear to have experienced no inconvenience in keeping their accounts in coins of much smaller value. Several countries, such as the United States, Canada, and the West Indies, which formerly kept their accounts in pounds sterling, have given up that system and adopted a smaller coin of accounts, even at the period when their commercial importance has greatly increased.

In North and South America, Canada, the West Indies, Spain and its colonies, and among the mercantile classes in China, accounts are kept in dollars = 4*s.* 2*d.*

In Prussia and Hanover, in thalers = 3*s.*

In India, in rupees of 2*s.*

In Austria and Holland, in florins = 1*s.* 8*d.*

In Sweden, in rixdalers = 1*s.* 8*d.*

In France, Belgium, Switzerland, Sardinia, Rome, Venice, Tuscany, Parma, Savoy, Greece and Russia, in francs, or other coins, worth about 10*d.*

From these observations it appears that the highest coin of account of these, which include the most commercial countries of the world except our own, varies from about $\frac{1}{5}$th to $\frac{1}{44}$th of a pound sterling, and these countries find no commercial disadvantage in the low unit of accounts. With regard to the question of an integer I take it as a rule that you should not change the money of the people, the penny or the halfpenny. I look upon a penny as of much more importance than the shilling. But it appears to me as a matter of very little practical importance, whether we take the unit of 10*d.*, or whether we take the American dollar of 100 halfpence. For if we are to make such a change we should look at it in the broader point of view. It would be desirable in the first place to consider what other countries have done. It does appear that all the migratory nations who have colonized the earth, and the Anglo-Saxon race in particular, prefer the dollar as the unit divided into cents. Go where you will the dollar seems to be the prominent coin, wherever the decimal coinage has been voluntarily adopted, as in the United States of America, in Canada, and in the West Indies, where all accounts are now kept in dollars and cents. Therefore I do not know whether, if any change is to be made, it would not be preferable that we should make a change in alliance with them; the dollar indeed may be regarded as the real coin of commerce; in France, although the franc is the coin of account, the coin of merchandise is the five-franc piece, which is very near the dollar in value. No doubt, if you were to consider this country alone, I should say take a coin of 10*d.*, and its decimal multiples; but I think the dollar has, in a coinage point of view, some advantages, and it is the second decimal multiple of our existing halfpenny. If so large a change as that of our coinage should ever be made, we ought to take into account every part of the question internationally as well as in other respects. I beg to read the following paper, written some months ago, on this subject:—

"From some of the discussions which have lately occurred, it would appear as if we ought to regard a decimal system of accounts and coinage as synonymous with the adoption of the French or, as it has been called, the '*metrical* system.' This assumption I conceive to be entirely at variance with the history of the subject, as I think the following outline will explain:—

"1. Certain countries, such as China and Portugal, appear to have used a decimal system of account from their first existence as civilised communities, or at least its existence has been traced back to their earliest historical records. In these countries, the system appears to depend on the circumstance that, having adopted such a small unit for account as the *cash* and the *ree*, its value is scarcely appreciable until it has been arithmetically accumulated, and, as their arithmetic is decimal, its accumulation necessarily follows a decimal multiplication. It is to be remarked, that in both these countries the coins are not decimal, but only the accounts. In China there is no coin but *cash*, silver being an object of merchandise varying in price with the state of the market, and in Portugal the coins are generally duodecimal, decimal coins having only been issued by the present Queen. The Russian system, it appears, ought to be arranged under the same category; they have from the earliest period of their history, as far as I can learn, counted their money by kopecks, 100 kopecks being a rouble; but, until the last century, they had no coin of that denomination, the Polish and coins of the neighbouring countries being in circulation. I have not been able to find the account of the introduction of a decimal system into Rome, Naples, and the other smaller Italian States; I only know that it was in use apparently long before the middle of the last century.

"The Roman decimal coinage is exactly similar to that afterwards adopted by the American, namely a *scudo* (= a dollar) divided into a hundred centesimi, but in the Roman and some other of the Italian States, the coins under the decimal system, and the mixed duodecimal and vicesimal system, were in use at the same time.

"Very shortly after the treaty of peace between Great Britain and the United States of America, which was ratified in 1784, the statesmen of the United States, finding the currency of the country in a most confused and unsettled condition, recognized the absolute necessity of placing it on a better footing. Indeed, Mr. John Adams, afterwards President, appears to have paid attention to the subject as early as 1775 and 1776; (*See* Works, Vol. II. 14 and 515); and Thomas Jefferson, who appears chiefly to have looked at it as it bore on the

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work of the counting-house, believed that there were certain advantages in a decimal system of computation. The question was referred by him to Mr. Robert Morris, the Financier of the Confederation, and he reported to the Congress on the subject in 1782. In 1784 Mr. Jefferson replied to his statements, and communicated to Congress 'notes on the 'establishment of a money unit and of a coinage for the United States,' in which he states what he considers the advantages of a decimal system of accounts; and in 1786 Congress made the 'experiment' which he recommended, but added to his proposition while passing through the Legislature, with the view of making it theoretically perfect, a mill (or a thousandth part of a dollar) which he had avoided, and which has never practically come into use; they issued cents, with General Washington's head on them, in 1791, but I have not seen any silver coins of an earlier date than 1794.

"In like manner as the 'Declaration of Rights' in America had so powerful an effect in France, in hurrying on the French Revolution, so this change appears to have had its influence as regards coinage and accounts; for it was not until 1790, four years after the adoption of the decimal system in America, that the attention of France was directed to the subject.

"The National Assembly in 1790 demanded the opinion of the Academy of Sciences of Paris on the propriety of fixing the alloy, and on other subjects connected with the coinage; and 'also their opinion on the scale of division which they considered most advantageous, 'not only for weight, but for other measures and for money.'

"The Academy appointed a Commission, consisting of MM. Borda, Lagrange, Lavoisier, Tillet, and Condorcet, who reported on the 27th of October 1790, recommending on the last subject the decimal system, not because it was the best, but because it was consistent with the system of arithmetic in universal use.

"This system was not brought into use in France until 1793 (An I.), when an ordinance was issued, dated 24th August in that year, 'directing the coinage of small money of a 'mixture of copper and bell metal to replace the pieces of two sous, of one sou, of six and 'of three deniers, by coins called *decimes* and *centimes*, and directing the coinage of pieces 'of one and five centimes.' And on the 28th Thermidor, an iii. (1795), the National Assembly made an ordinance for the 'issue of a good monetary currency, and the 'application to money of the new metrical system.'

"The chief practical alteration introduced was, the requiring people to count the change of the frank or livre by ten double sous (or decimes) instead of by 20 sous, an alteration which has not been brought into general use, even up to the present time; and this fact fully justifies Mr. Airy's observation, that more than half a century after its introduction 'the decimal scale seems not to have got hold of France,' and also that of a friend who had been used to the decimal coinage in America, who observed to me that 'he went to 'France with the idea that they had a decimal coinage, but somehow the sous always got 'in his way.' This historical account also appears to justify Mr. John Quincy Adam's observation in his report of 1821, that 'the French themselves, in the application of the 'system to their coin, have followed our (the American) example.' During the discussion of the question in America, the Sierra Leone Company, established to encourage trade with Africa, and to find a home for the negro soldiers who had entered the King's service in the unhappy American war, in 1791 issued, apparently from the Birmingham mint, four silver and two copper decimal coins, all bearing a lion on one side, and a pair of hands (black and white) united in friendship on the other; these pieces are called a 'dollar,' a 'half dollar.' 'twenty cents,' and 'ten cents piece,' marked with the numbers 100, 50, 20, 10; the copper coins are called 'one cent piece,' and 'one penny piece,' thus retaining the name of that universal coin in the decimal series. These are amongst the first decimal coins issued and are of beautiful workmanship.

"II. I do not know whether the meeting in favour of an international coinage in Paris is to be taken as an attempt to flatter the vanity of the French, or as a real desire on the part of certain persons to endeavour to make the metrical system of France universal. If the latter is the case, I must say that I consider it a great mistake, and one only to be explained on the supposition that it must have been taken up by persons who look upon the subject as one interesting to them as occasional travellers, rather than for its commercial convenience and general usefulness. If we were to change to a decimal system for such a purpose, and especially to obtain a coinage identical with that of any other country universally current at its coined value, which I believe to be utterly impossible in practice, it would be much more rational to make our system as nearly as possible like that of the Americans and of our own colonies rather than like the French, when we consider the amount of trade and commerce between these two countries,* compared with France and the countries which have adopted the French coinage; the community of language, common origin, and the rapid progress which the Anglo-Saxon nations are making in extending their habits, manners and customs, and their monies, in different parts of the world.

"In support of this view, it may be further observed that several countries (especially our own dependencies, such as Canada, the West Indies, Singapore, &c.), have voluntarily adopted the plan used in America:—in Singapore evidently not as an imitation, but for

* Thus by our official returns, the declared value of the exports to the United States and Canada in 1854 was over 24 millions; and to France, Belgium, and Holland united, under 9 millions. The imports from the United States and Canada in 1854 were over 31 millions; and from France, Belgium, and Holland united, under 15 millions of pounds.

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the same reason that the Americans adopted it, the merchants finding the Spanish dollar to be the chief coin in use among their European and native customers, and that an hundredth part of it is a convenient coin of account, and sufficiently small to be used both in wholesale accounts and for daily traffic among the people at large. The French system, though it has been extended to various parts of Europe, has never been voluntarily adopted by the people until it has been forced into use at the will of the first Napoleon during his occupation of their territory; and indeed some countries where it has been introduced, and the coin even issued, as in Bavaria (edit 1809), Westphalia (edit 1807), the Duchy of Baden (edit 1808, 1810), have refused to continue it, and returned to their old system.

"The only instance that has occurred to my knowledge of any country receiving another nation's money as its own is in Belgium, where, on the re-adoption of the decimal coinage the 23rd Article of the Law of the fifth of June, 1832, declared 'the gold and 'silver decimal monies of France are to be received at the offices of State for their nominal 'value;' but I never heard that France had been equally complaisant in that respect, as I know by experience that the Belgian shopkeepers will rather lose the sale of their small wares than take French copper money in exchange.

"Formerly, from the scarcity or total absence of any national coinage, Holland, Hamburg, Genoa, Ireland (before the union), and other places, received silver, and especially the gold coinage of other countries, at the intrinsic value of the pure metal they contained; and the United States made it a particular law, when they established their new coinage in 1792, 'for the time being the gold and silver coins of Great Britain, France, Spain, and 'Portugal are allowed to be legal tenders in the payment of all debts within the United 'States at the general rates following, to wit.'* * * * 'Provided that no foreign coin issued 'subsequent to the first day of January, 1792, shall be legal tender till samples thereof 'shall have been assayed at the mint, and found to be respectively agreeable to the general 'standard established by law.' When this was the case all traders were required to have 'money scales," as the Chinese still carry steel or rather ivory yards to determine the weight of each coin offered, and to deduct 2*d.* or 2½*d.* for each grain deficient from the standard weight of gold coins; in fact, turning every one into 'money-changers,' a state of affairs certainly not to be desired. I believe, however, that each of these countries, as they have gradually established their mints and coined for themselves, have abrogated this custom of receiving foreign coins, and no longer consider any other coin than their own to be a legal tender. Indeed, this is the less necessary as there are in every country of any commercial importance, bankers and money-changers versed in the knowledge of foreign coins, who exchange them for the money of the country at, or very nearly at, the value of the pure metal they contain, and sometimes, when the exchange is in their favour, even at a higher rate. I believe that all the promised advantages put forward by the advocates of an international coinage would be procured by doing as was done by the American and French, applying the decimal system to the coins now in most general use, and choosing for the unit a coin of small value, in order that there may not be required more than one or at most two places of decimals, and that the smaller coin shall not be too small for the people to use as a whole number, as they undoubtedly will in their computations, and yet not too large to be decimally subdivided, if necessary, for more minute calculations.

"It appears to me that the *penny* and its decimal multiples embrace all these advantages. Five tenpennies would be nearly identical in value with the dollar of the United States and the scudo of Rome; and as they are subdivided in the same decimal manner, there can be no difficulty in very quickly and certainly calculating the difference per cent. between any number of the coins of other nations in their decimal parts.

"I believe that it is simply impossible to have a universal coinage that shall pass current at its nominal value in other countries than that in which it is issued; for if at this time the various countries of Europe and the United States were to come to an agreement (which I think is very unlikely) to issue such a universal coin and its multiples, and make them legal tender in each country, they must also agree that they will not make any difference in the form, fineness, or standard of their coinage, such as America has several times found it necessary to do to prevent the silver or gold from leaving the country, or the coins with the altered value could no longer be so received, and could only be regarded as objects of merchandise according to the value of the pure metal they contain, as at present; and this would be such an interference with the free action of the currency of a country as no nation would submit to. For example, the sovereigns coined at the branch of the Royal mint in Australia are not received as legal tender there or here.

"Secondly, If the coins were themselves of equal value, there would always be the fluctuations of exchange, as clearly pointed out by Mr. Sumners of the United States, at 'Congress held last year in Paris. "This exchange," that gentleman observed, "exists 'between different parts of the same country; it exists amongst the thirty republics of the 'Union; it is seen in France between the great centres of population.' If this is the case with the coins from the same mint of the same country in different parts of its dominions, how much more obvious would be its effect as regards the coins of other countries circulating throughout the different nations!

"Lastly. I would inquire why and for what benefit is this change to the decimal and international system to be made.

"Our system of money and coinage is equally well adapted for the use of the largest merchant and banker, and for the poorest of our people. It is not the 'Babel of confusion,'

urgently requiring 'renovation,' like that of America and France when they adopted the decimal system. Nor have we, thank God, the heel of the conqueror on our necks, as when the Dutch, Italian, and Swiss accepted the change, less for the advantage of the people than to satisfy the ambition and glory of the conqueror.

"The change is certainly not called for by the merchants and bankers, who know full well the fallacies of the argument by which it is recommended, as is proved by the decided manner in which they have kept aloof from any general expression of interest on the question. It is as certainly not required by the mass of the people; for the females of all classes, and the vast majority of the men, when spoken to on the subject, content themselves with the expression of a fervent hope that 'it will not take place in their time;' and even among the great agitators for the adoption of the decimal system, there appears to be no sincere belief in the advantages of the decimal system in the abstract, nearly all of them declaring that if they cannot have the special system for which they plead, no other will suit their purpose, and they would greatly prefer having no change for the present."

418. (*Lord Overstone.*) Has it ever come within your experience, practically, to meet with any persons, of any class in the community, who, when taking our existing coins, for the purpose of paying and receiving, have complained of the inconvenience of those coins, and expressed a wish for a different system, with the view of obviating any practical inconvenience?—Certainly, it never has. I may state that I cannot find out where and how the agitation of the question has grown up; it must be confined to a very few people; go where I will I find that the number is limited, and we always have the lady part of the population, who do not like changes, on our side. Here is a petition from the city of London, in which I find it is recommended; but when you consider the large number of inhabitants in London, and the few signatures to this petition, we see at once how few are the individuals who recommend it, and how very few indeed the persons are that are represented.

419. (*Chairman.*) What is the remark at the end of that paper?—If you refer to these three small &c. &c. &c. in the corner, attach little value to them, as there is a blank in the first column above them not filled up with names.

420. Does not that mean that there are other names than those appended to it?—Possibly it may; but I know that in some of the firms said to sign it, as for example, that of Morrison, Dillon, & Co., some of the partners are strenuous opponents of the system; and I am perfectly satisfied the same is the case with many of the firms which I see there signed. I know, of my own knowledge, some directors of the Bank of England, members of the Stock Exchange and of Lloyd's, are opposed to the system referred to, and are decidedly against any change.

421. You know that the number of signatures to every petition is printed by the authority of Parliament; would it surprise you to hear that that petition, which in its present state only contains a very small number, practically contains close upon 1,000 names?—I only know the paper as it is sent forth by the Decimal Association, and I presumed that they would give all the names which they considered as worth printing, as the other side of the paper is quite blank.

422. But it ends with &c. &c. &c.?—I only know that, although a great deal has been said about it, this petition, go where I will among the commercial men, either in London, Manchester, or even in Liverpool, it is a subject that they scarcely ever speak about, and if ever they do it is to express a strong opinion against any disturbance of the present system.

423. Have you ever heard whether any one single petition, from the commencement of this inquiry up to the present time, has been presented against the adoption of the decimal system?—I have not heard that there has; and this may be accounted for by the fact that there is no association which is trying to procure petitions against a change, while there are two associations agitating to procure petitions in favour of a change, and it is from those associations, and from them only, that these petitions originate. I have here a circular, dated on the 27th of March last, from the Decimal Association, calling upon the parties addressed to send in petitions, and we all know how easily petitions can be procured by such means.

424. If the question has been in discussion for upwards of 10 years, if it has received the sanction of a committee in Parliament, and a vote of two to one in the House of Commons, and there has been a presentation of upwards of 100 petitions from different places, and a great deal of controversy of which you are conscious, and to which you have very ably contributed in a printed form, if the mass of the people were adverse to such a change, how do you account for the singular silence on the part of all who object?—Because I believe that the mass of the people regard the agitation as one of mere theory, and feel assured that the change will not take place. If the people really believed there was any serious risk of such a change, it is impossible to imagine that they would remain silent; but too much weight should not be attached to the fact, that as yet no petitions have been sent in against the change, the opponents have not yet formed societies to agitate the country. They have carefully abstained from such a course. The difficulties of the Government will arise when they attempt, if ever they do, to introduce the smaller coins which will form no aliquot part of the existing coins, consequently will not form with them any even sum in either the old or the new system.

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I am aware that a majority of the House of Commons have declared "that in the opinion "of this House, the initiation of the decimal system of coinage, by the issue of the florin, "has been eminently successful and satisfactory;" but I have never been able to obtain from any of the members who voted in that majority, from any members of the Decimal Association, or indeed from any one else, an answer to the question, "Who had ever used the florin as an initiation of the decimal system," or in any other way than as a simple two shilling piece: or how, until the law is altered, allowing accounts to be presented otherwise than in pounds, shillings, and pence, it could be legally used as an initiation, or in any way help to introduce the decimal system. Fortunately, even a vote of the majority of the great inquest of the nation cannot make things what they are not. It cannot fail to be observed, that after passing this very questionable abstract resolution, the majority shrank from the real question, and the mover withdrew the only practical part of his motion—the issue of the cents and mils. It is well known that a large number of members allowed their names to be used by an association formed to agitate for the introduction of a special kind of Decimal Coinage, believing, as many of them now declare, that they were only signing in favour of a decimal system generally. And, as one of the late Chancellors of the Exchequer afterwards observed, there can be little doubt that the majority was influenced by other motives, rather than any special love for cents and mils.

I may cite the words of Professor de Morgan, himself the greatest and most active advocate of the pound and mil system, as conclusive evidence against the resolution of the House of Commons, "In the name of common sense," says that gentleman, "how can it be objected to a system that people do not use it before it is introduced? Let the decimal system be completed, and calculations shall be made in florins, that is, florins shall take their proper place. If florins were introduced now, there must be a column for the odd shilling." Surely this is a complete contradiction of the resolution of the House, which says that florins have successfully initiated the system.

425. (*Lord Overstone.*) You have no reason to suppose that the people of this country generally contemplate the introduction of the decimal system as a real, practical measure which is actually impending over them?—I certainly can say quite the contrary. Speaking to people in commercial establishments I find that they almost universally look upon it as a question that is not practically impending over them.

426. You believe that the community generally look at it as a theoretical arrangement rather than as a practical reality?—Entirely so; even taking the Bank of England, Messrs. Brown, Shipley, and Co., and Messrs. Morrison, Dillon, and Co., as fair representatives of the commercial community of London and Liverpool, I do not hesitate to state, from an acquaintance with many gentlemen connected with these establishments, that, if they were fairly canvassed, it would be found that a vast majority of the directors, the partners, the cashiers, and the clerks engaged in them, are decidedly adverse to any change in the coinage; they generally express their perfect satisfaction with the present system. I will add that the few directors of the bank, together with Mr. W. Brown, and Mr. Dillon who are the leaders among the commercial men in the agitation for the change, are not so from any predilection for a decimal system in the abstract, but are only desirous of obtaining the special decimal system which they advocate, and openly avow that they would prefer that there should be no change if the pound and mil scheme is not to be adopted. The members of the Stock Exchange and Lloyd's, with whom I am acquainted, all assure me that they do not want any change, and that the subject excites no interest with them, chiefly because they believe that it never will be attempted to be carried into execution, and they cannot conceive for what interest the change is proposed to be made. Indeed, as far as I can learn, the subject only interests a very few persons indeed. I know from experience that pamphlets on the subject do not sell; Mr. Ridgeway at the west end, and Mr. Effingham Wilson and Mr. Richardson in the city, have each told me so. Mr. Ridgeway informed me he was desired by one author on the subject to give his pamphlet away, but he doubted if the few who availed themselves of the gift even read it; Mr. E. Wilson has repeatedly told me that he does not keep any stock of these pamphlets, because they are not called for like other pamphlets on commercial questions, and that the copy he has procured for me has been the only one he has sold! I know that the newspapers either refuse to insert articles on the subject, or when they have inserted one or two refuse to continue the discussion, because they excite no interest among the people, and this even when the editor or sub-editor themselves take some little interest in the question, and have themselves taken a part in the discussion. The officers of the Society of Arts, the house where first the Decimal Association, and since they have left the International Association, have held their meetings, have repeatedly told me the public take no interest in the question. It is the same with the meetings; I am informed that at some of the meetings of the International Association only a very few, under a half-dozen persons, have attended; and the Decimal Association have disbanded their staff, given up their office, and now send forth their circular from "the Gresham Club" in the city. Some persons believe that interest is taken in the subject because several pamphlets have been published; but, if these writings are examined, it will be found that the greater part of them are from persons who have paid little attention to the subject, who write on the spur of the moment believing that they have made a great discovery, and hasten into print with so little knowledge as plainly to show by their want of information that they take no particular interest in the matter; it was to assist in dispelling this delusion that I extended the list of papers, &c., on decimal systems, printed in the Journal of the Society of Arts.

427. This petition is signed by Morrison, Dillon & Co.?—Yes.

428. Is not Mr. Slater a partner in that firm?—Yes.

429. Is that the Mr. Slater who gave evidence strongly expressing his opposition to the introduction of any decimal system?—Undoubtedly the same.

430. (*Chairman.*) Are you not aware that Mr. Dillon is also an acting member of that house?—Undoubtedly the most active member.

431. Are you aware that he has been examined upon the subject, and has expressed a strong opinion in favour of the matter?—I am not aware that he has been examined. He went up on a deputation, of which your Lordship also formed a part, to the Chancellor of the Exchequer, I believe.

432. (*Lord Overstone.*) Do you know anything of the opinions of Mr. Dillon?—Yes, perfectly. We are old friends. But I did not intend to introduce personal considerations; I only wished to state, generally, that I had found that many persons belonging to firms or societies which are said to have signed that petition, are either adverse to any change or to the system proposed.

433. (*Chairman.*) Are you not aware that at one of the public meetings held upon the subject, Mr. Dillon was one of the parties who came forward strongly advocating and recommending the decimal system?—I am quite aware that he attended a meeting, but I could hardly call it a public meeting. I believe, although Mr. Dillon is an active advocate (and that I believe is very general with those whose names are attached to this petition) for the pound and mil system of decimal coinage, he would be very sorry to see any other system carried into execution, and would rather the coinage remained as it is.

434. Referring to the definition which you give in page 9 of a perfect decimal system of coins and accounts, namely, that the various denominations of money of account should increase by a regular decimal progression, as all that was necessary to enable us to use a simple instead of our present compound arithmetic, is not that definition of a perfect decimal system of coins and accounts realized in the mode in which we state the pounds as distinguished from the shillings, pence, and farthings?—Undoubtedly, because our arithmetic is decimal, and therefore the accumulations of any number of the same denomination must be decimal also. It is the same thing as occurs with regard to the rei in Portugal, the cash in China, and the kopeck in Russia, as I have before stated, but it does not bear on the millesimal division of the pound into fractions.

435. I ask you whether, with respect to the facility of the operation and avoidance of the chances of errors, there is not a distinction in favour of the statement of pounds and working out pounds simply, over the statement and working out shillings, pence, and farthings, in all the more complicated systems of accounts?—There can be no doubt that there is a greater regularity in the mode of their addition, but I believe that the breaks are useful in diminishing the chances of error. I may observe, as an illustration of the question, that a great deal has been said about the introduction of the decimal system in weighing gold in both the Mint and the Bank of England; yet I am told by more than one officer in both those establishments that they prefer the old method to the new one, as being more easy and certain in the operation.

436. In page 22 of your pamphlet you refer to the head of the bullion department as an authority to show "that the change had not been attended by any reduction of labour, but "on the contrary, by an increase; that the clerks were continually obliged to refer to the "table showing the two systems, and that the new system was found so inconvenient that "two of the largest bullion brokers refused to use it." Could you give the Commissioners the names of those bullion brokers?—I do not consider myself at liberty to mention their names without permission. But I give you the words exactly as Mr. Haggard used them to me in conversation. I asked whether he had any objection to my recording it, and he allowed me to do so; and I was told at the Mint exactly the same thing by two of the chief officers a few months ago. And I may further add, that since the new system has come into use at the Bank, they have found it necessary to publish "Decimal Tables as used at the Bank."

437. Are not the uses of the tables referred to rather for the purpose of convenience in referring, and converting the old system into the new?—No, they have nothing to do with the old system. There are two other similar sets of tables lately published, one by Mr. Slater's son.

438. They are used in the same way as interest tables, are they not?—Yes; probably.

439. Are they in general use in commercial houses?—If you refer to ready reckoners I believe they are not used in commercial houses. They may be used in some private families, but I believe there is a great objection on the part of commercial men to shopmen who do not calculate by mental arithmetic, which is done more rapidly than by referring to tables; whereas no doubt one of the great evils of a change of the coinage would be that it would render the system of education by mental arithmetic hitherto followed useless, so that all shopkeepers, retail traders, and their customers would have to learn a new system. Mental arithmetic is one of the things which the poorer class of people particularly attend to; it is so useful and familiar to them that many can reckon extremely well who cannot either read or much less write; and the whole of that information which has cost them many years to obtain would be rendered useless by the change.

440. You suggested, did you not, as a possible inconvenience of the decimal system, the confusion that might arise by the use of the decimal dot, if placed erroneously?—I did; in

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my pamphlet, I have cited a remarkable instance, see page 6, where the very clever author of a pamphlet in favour of the pound and mil system, has made a most gross mistake of the kind, and I could refer to others.

441. Do you think that the system of pounds, florins, cents, and mils, would require in any shape necessarily the use of the decimal dot?—I think it would, unless you keep your accounts wholly in mils or farthings reduced four per cent. in value; and you would have to state your national debt, as that is the favorite example, and every other amount, in farthings, a most useless, and, indeed, senseless change.

442. Suppose in the ordinary system of dividing or mode of enumeration in a common account book, as is the case between pounds, shillings, and pence, that faint lines were drawn between florins, cents, and mils, what would be the difference of protection or convenience given in the one case or in the other?—It would be very well so far as books of accounts were concerned, but when you came individually to state the items of your account on ordinary paper, for calculations or otherwise, you would not have those lines then, and you must put in your dot, and even with the line without the dot I fear mistakes would be numerous.

443. Would you not have the same protection against confusion in pounds, florins, cents. and mils, that you now have in respect to pounds, shillings, and pence?—You might as far as account books are concerned, but the decimal dot is more facile, and would be used on ordinary statements of accounts as it is in most of the decimal systems now in use.

444. You stated originally to the Commissioners that the use of the decimal dot might, from mistakes in placing it, lead to inconvenience and confusion?—Allow me to observe, I believe your lordship is speaking of large sums; I was referring to small sums; I referred particularly to sums of a few pence, where if you do not put before the dot the necessary noughts, the amount would look as if it were stated in pounds instead of mils, that is where one great difficulty is. As far as large sums are concerned you might have books all properly ruled, but the difficulty is in the small sums, which after all make up the real pecuniary transactions of life. The small sums are what our coins are made for.

445. Are you able to tell the Commissioners whether any such confusion arises in stating francs and cents in France?—They always use the decimal dot, and they use only two denominations. It is a remarkable thing in France that as ·05 only represents about the value of a halfpenny, you scarcely ever have any other terminal figure than 5. If the same rule were to prevail in the pound and mil system, as it most assuredly would in most cases your steps instead of being by halfpence would be by nearly five farthings at a time, and there would then be a great loss on small sums and their accumulations.

446. (*Lord Overstone.*) Will not the difficulty you are dealing with be increased in consequence of the wider space between our highest and lowest money of account?—Undoubtedly; it is that which creates the insurmountable difficulty of the system of reckoning by pounds and mils.

447. (*Chairman.*) So far as accounts are concerned, would it be anything more than a representation requiring three figures according to the mil system, and in France according to the cent system requiring two?—In France the last figure is almost always 5.

448. Is not that a matter of convenience?—It is comparatively a very small sum which the 5 represents there; it represents as low as a halfpenny, and, therefore, accounts do not generally require any other figures; in our case, where the cent would represent a much larger sum, we ought to have a variety of those figures.

449. Suppose they write down 75 francs in France they employ two figures?—Yes.

450. And all the multiples of 5 up to 100 would be represented by two figures?—No doubt of it; but the decimal figures being less numerous, only two instead of three are much more easily comprehended, especially as the second column is of so small a value. But for facility it is certainly much better to use the fractional half, as in our system, which half, either in writing or calculation, is quite as easily made and understood as if it were only a single figure.

451. Have you seen any accounts kept in such a way as mechanically to guard against a mis-statement in the pounds by putting the pounds under the wrong column, and in the shillings a similar mistake, or mixing the shillings with the pence, and as to the pence guarding them from mixture with the shillings?—Such things must occur. I have seem some accounts made out according to the pound and the mil system; they look very heavy and difficult to read from the sameness of the figures. I am told by persons who have tried them they are difficult to add up.

452. I am referring to our present system. Will you just look at that account, (*an account being handed to the witness,*) and see how it is guarded against the possibility of mistakes?—It may possibly be done as regards such accounts.

453. In that account are there not faint lines to distinguish the separate places of the pound sterling, and faint lines to distinguish the separate place of the shillings from the sixpences, and where decimal fractions are added are there not faint lines to separate them from the higher denominations and from each other?—In the paper you showed me it is so, but this consists of large accounts from the National Debt Office; the case which I am always more particularly desirous of referring is that of the small sums,, that is where the difficulty is. In regard to large sums there is no doubt that people who are in the habit of making out their accounts and of dealing with large numbers find no difficulty in any system of accounts which they use; whatever the system may be is to them of very little

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importance, but we must recollect that coins are for the use of the poor and uneducated, who know little of accounts and still less of large sums.

454. But with respect to France, are not the smallest accounts made out in francs and in centimes, without inconvenience or confusion or complaint?—But it is exactly as if we made out our accounts here in shillings and pence only. There are only two denominations, the highest being less than a shilling in value, so that small sums are more easily recollected.

455. (*Lord Overstone.*) Is it within your knowledge, or are you able to answer the question, whether in France the small accounts are made out in francs and centimes without inconvenience or confusion?—I should say that they were as liable to confusion as a similar system would be among ourselves. I have a relative who is very much occupied in putting down decimal figures, and he tells me that the manner of putting down decimal figures is much more difficult than putting down pounds, shillings, and pence, and that difficulty increases in exactly the ratio in which these figures are lengthened. He is in a bank where they use decimal accounts for receiving gold, and he says that in putting down a multitude of decimal figures he finds more liability to error than in putting down pounds, shillings, and pence, arising from the figures having no variety of relation the one with the other. It is like the letters of the alphabet placed in confusion and in words; the one it would be almost impossible to recollect and the other comparatively easy. I should state that to him both systems were equally new for the purpose for which they were applied, and that he was well versed in the use of decimals, so there was neither practice nor prejudice to be overcome.

456. You referred a little while ago to mental arithmetic; have you considered the comparative merits of the decimal system and the present system as to its facility for mental operations by the lower classes?—Mental arithmetic as now taught would be utterly destroyed. It depends upon the varied relations between our weights and measures and our coinage. It is in these variations that the facilities of mental arithmetic consists and if you alter the system of coinage you entirely alter all the rules of mental arithmetic. To show the connection of mental arithmetic with our present coinage it is only necessary to quote a few of the common rules:—"1. To find the value of a dozen articles, take the price in pence as shillings, and add for each farthing 3*d.* 2. To find the value of any number of grosses, find the value of one dozen, and take that amount as the value of one of another dozen. 3. To find the value of 100 articles, the price of one being given, for every farthing take as many pence and twice as many shillings. 4. To find what any number of pence per day will amount to in a year, take the 365 days as pence and multiply that sum by the number of pence given. 5. To find the value of a pound at any price per ounce, take the price in farthings as shillings and divide by 3. 6. To find the value of an ounce at any price per pound, take the shillings as farthings and multiply by 3. 7. To find the value of a hundred-weight at any number of pence per pound, multiply 9*s.* 4*d.* by the number of pence. 8. To find the value of a pound when the price of the hundred-weight is given, multiply the price in shillings by 3 and divide by 7, and you will have the value of one pound in farthings. 9. To find the interest of any sum of money at 5 per cent. for any number of months, take the pounds as pence and multiply by the months. 10. To find the value of an ounce at any price per pound, take the shillings as farthings and multiply by 3, or the price in pence and divide by 4; the answer in farthings. Almost every trade have their own rules of mental arithmetic specially adapted to their purpose, and depending entirely on the mixed divisions of our money, weights, and measures. These rules are well known both to the grown persons employed in the trade and the public; supposing a new system introduced, they will have to learn new methods of counting, so that any change must be injurious to them, and can only be advantageous (if at all) to those that are not yet born; hence we may very well account for the total want of interest in the subject shown by the people at large. "In the exclusive adoption of decimal sub-divisions, M. Hippolyte Dussard (of Paris) saw only *a moderate advantage,* since the ancient subdivisions familiarize the mind with the calculation of aliquot parts, the use of which is so frequent in actual practice." "M. Joseph Garnier (of Paris) agreed with M. Dussard on the necessity of making young persons familiar with the calculation of aliquot parts. Notwithstanding the advantages of the decimal subdivision it ought not to be adopted too exclusively. The subdivision into halves, quarters, eighths, and into thirds, sixths, twelfths, &c., is equally natural with the decimal subdivision, and in certain circumstances is more convenient and better accommodated to practice."—*Yates, Narrative,* p. 45.

457. As an example of comparative facility for mental calculation in the public market, take the case of 1*s.* 4*d.* and 1*s.* 8*d.*, which I presume any ordinary person would at once know make 3*s.* Do you think, if the equivalent values of those two sums were taken in mils, namely, 66 mils and 83 mils, it would be equally easy for an ordinary person in the market to know that they made 149 mils?—Certainly not.

458. If you add to that 1*s.* 6*d.*, which every ordinary person would know makes 4*s.* 6*d.*, do you think that in the addition of the equivalent sum in mils, namely 75, would be equally easy for an ordinary person to know that the three sums which in the one case make 4*s.* 6*d.* in the other make 224 mils?—No.

459. Do you think that in the one case there would be a facility of saving time and an opportunity for accuracy which would be lost in the other case?—Undoubtedly. It refers

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to all the concerns of domestic life, and I think that the difficulty of reckoning for the people at large will be tenfold increased.

460. Do you think that the particular case that has been put to you is a mere sample of endless multitudes of transactions of a similar character, which must occur in every market and in every shop in this country daily?—Undoubtedly.

461. And the inconvenience, therefore, which you think in that particular case would clearly attend the decimal system is an inconvenience which would exist in a multiplied number of instances throughout every market and in every shop in the kingdom?—It would be an enormous evil and an intolerable grievance upon the poorer classes. Then, again, there is the difficulty of the change of value, which is a matter to which I would beg particularly to draw the attention of the Commissioners. Now you have a penny, but according to the pound and mil system the coin will be five farthings instead of a penny. It is very easy to say that competition will make all these things right, but if the four farthings produce as much as a man wants, and you compel him to spend five, it is a great grievance. Wherever you have a decimal system you may depend upon it that the price of all common articles will be five and not four. Though the coin is divided into ten, you may rest assured that people will halve it; the half is a division so imprinted in the human mind that you will always have articles sold by halves and quarters, whether your coins be decimal or non-decimal. If your cent is $2\frac{1}{2}d.$, the half of which comes to five farthings, a penny article will be sold for five farthings: competition may in some cases increase the quantity of the article, so that you may get additional weight, but still the shilling will only be sufficient for 10 purchases instead of 12, and practically there would be a loss of $2d.$ in every poor man's shilling now laid out in pence. I speak on this subject from experience of what I have seen on the continent, and from my knowledge of the general nature of the purchases of the poor.

462. (*Chairman.*) Have you heard that this loss was sustained in any of the foreign countries where such a system was abandoned and another preferred and substituted?—There has been no such system brought into use during the period I have been in any country, except in Switzerland, where much imposition is constantly practised, in charging according as it is the interest of the seller to calculate by the new or the old coins. But generally, my experience in all countries of Europe where the decimal coinage is in use, is that you have always the five as the lowest denomination of accounts; that is taken as the lowest sum, and there is never any intermediate one.

463. As you have had experience in those countries, and have taken the trouble of investigating the consequences of those changes, has the result of your inquiry led you to imagine that it involved a great forfeiture of the interests of the buyers, adding to the profit and advantage of the sellers?—I think the evil is great on both sides; I have never been at the very time when the change has taken place, except in Switzerland; but I judge by the uniform use of 5 as the lowest denomination, that if in this country 50 mils are made equivalent to a shilling, you will only get 10 such denominations out of your shilling instead of 12; and although you may say that 4 mils will more nearly make a penny, still such is the strength of custom in resorting to a half, of whatever the account consist of, that you will lose by it, and this by no means arises from indifference to the loss. I have not myself had personal experience, but I have been told by Mr. Foggo, an artist who was in Paris during the time of the change that took place in France, that the continued battle that existed solely on account of the difference between the livre and the franc, was something quite fearful; the difference was $\frac{1}{80}$th, and there was no coin representing $\frac{1}{80}$th; they gave you a franc and a centime, but a centime was not enough, and the battle was whether a second centime should be given or not.

464. In page 35 you state the danger that might result from the adoption of the pound and mil system, from "the fearful amount of labour, the endless accumulation of blunders, "and the incalculable frauds of which the ignorant and unwary would be the certain "dupes." Is that the result to which you have now come, and to which you invite the approbation of the Commissioners?—Undoubtedly; I go on to say that the system would cause "injustice to the community at large, independent of the more mechanical difficulties "in the way of its adoption, which Sir John Herschell, one of the strongest advocates of "the system, has so well described, as well as the gradual and cautious manner in which "alone it either ought to be, or could be carried out;" that appears to me equally important as one of the grounds on which I come to my conclusions.

465. Nothwithstanding that statement, I need not ask you whether Sir John Herschell is favourable or adverse to the question?—His opinion, like that of many learned mathematicians to whom it offers no difficulties, is favourable; but he has clearly stated it as his deliberate conviction, that the people would require a long preliminary preparation for the change; I think he says 20 years, and he gives the most cogent reasons for coming to this conclusion.

466. At page 33 you state, "In the system proposed by the Parliamentary Committee, "the pound sterling would be preserved as the unit, an advantage it must be admitted, "indeed the only redeeming point of the system, but one that may be purchased too "dearly." I ask you whether, independently of the connection of this with the pound and mil scheme, you consider that the preservation of the pound unit as the integer is a material point?—I consider it so far desirable that I would not make any change at all; but if it is necessary to have a decimal coinage, it can only be obtained, so as not to be injurious

to the mass of the people, by the abolition of the pound as a coin of account; I have before given my reasons for this opinion, in detail.

467. (*Mr. Hubbard.*) Not comparing the preservation of the pound with any particular system, but taking it by itself as a great point, is it your opinion that it is better to preserve the pound sterling than to adopt the best system of decimal coinage with which the pound sterling would not consist as the unit of value?—I have said that I consider our present system as perfect as it can be. I do not see what are the advantages which we shall derive from any change, unless you make a change for international objects; but for our own individual purposes I do not see the advantage of a change. I would rather remain without any change.

468. (*Chairman.*) Do you not say, at page 9, after your very correct definition of a perfect decimal system of coins and accounts, "A simple system of this kind there is no doubt would, in the words of the Committee, 'simplify accounts, greatly diminish the labour of calculation, at the same time that the education of the people would be much facilitated by the introduction into our schools of a system so directly calculated to render easy the acquirement of arithmetic,'—which desirable results would, however, certainly not be obtained by the plan proposed by the Committee itself?"—Precisely. But I confess that the more I have examined into the decimal system as it exists in other countries, the more convinced am I that its advantages have been greatly overrated, and its disadvantages overlooked. When I came to examine more particularly into the practical working of a decimal coinage in other countries, and to consider the inconveniences which must accompany a change to it, I became fully convinced that they are far greater than the presumed theoretical advantages of a decimal system; but if it is determined that the change is to be made, then I still advocate the retention of the penny, and making it the basis of the system. Upon the question of the education of the people, I feel satisfied, on mature consideration, that it would be no advantage whatever; I think, on the contrary, that the system, teaching the people to count solely by tens, would be an absolute disadvantage in education. The present system gives origin to whole series of rules of arithmetic, which, if you reduce them to nothing but counting by tens, would generally be discarded, and you would thereby diminish the usefulness and the perfection of the system of education. I would say, of the exclusive adoption of the Decimal system, as to its effect on education, what M. Janet says of the tendency of the present system of education in general, which, by professing to make arithmetic amusing, and geography a joy, takes all bone and muscle out of the child's character, and sends it into the world flabby in principle and impotent of purpose. Just imagine how cramped and dwarfed must be the mind of clerks in general, if they were condemned only to count by tens; and what a miserable mill-horse routine they would be subjected to in their monotonous daily round. By attempting to simplify too far, you diminish the amount of useful knowledge, and reduce the mind too much to the condition of a mere machine.

469. If you can gain the same results by simpler means, with less danger and less risk of inaccuracy, do not you think that any more complex system of teaching is so much time and labour thrown away?—I have not yet found that you get greater accuracy. I dispute that assumption, and I think that I can prove to the Commissioners that even people who have been most strong upon that question have found reason to modify their opinions. If you refer back to the report of the French Academy itself, on which the present French system was founded, it distinctly tells you that they would never have recommended the decimal system, but the duodecimal, were it not the latter would have required a change of the system of notation,—they only took it because they found it most conformable to the imperfect system of notation in use. A reviewer, in an able article upon that report in the *Edinburgh Review*, said to have been Professor Playfair, expresses his regret that they did not adopt the duodecimal system, and gives very cogent reasons why that system ought to have been adopted in preference to the decimal. Professor Leslie, too, in a most philosophical book on arithmetic, shows in detail the great advantage of duodecimal arithmetic over decimal. And there is a modern Italian book, dedicated to the English nation, demonstrating its superiority. I have in my hands a paper, which was pointed out to me by one of the gentlemen connected with this Commission, containing an extract from Napoleon's Memoirs, by Comte Montholon, in which Napoleon himself specially points out the advantage of the duodecimal over the decimal system. The passage is as follows:—

"Les savans conçurent une autre idée tout à fait étrangère au bienfait de l'unité de poids et de mesures ils y adaptèrent la numération décimale, en prenant le mètre pour unité, ils supprimèrent tous les nombres complexes. Rien n'est plus contraire à l'organisation de l'esprit, *de la memoire* et de l'imagination. * * * Il est vrai que la numération décimale généralisée et exclusivement adapté au mètre comme unité donne des facilités aux astronomes et aux calculateurs, mais ces avantages sont loin de compenser l'inconvénient de rendre la pensée plus difficile. La première caractère de toute méthode doit être d'aider la conception et l'imagination, faciliter la mémoire donner plus de puissance à la pensée. Les nombres complexes sont aussi anciens que l'homme, parcequ'ils sont dans la nature de son organisation, tout comme il est dans la nature de la numération décimale de s'adapter à chaque unité, à chaque nombre complexe et non a une unité exclusivement. Enfin ils se servirent de racines Grecques, ce qui augmenta les difficultés, ces denominations qui pouvaient être utiles pour les savans n'etaient pas bonnes pour le peuple."—"Le

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nouveau système de poids et mesures sera un sujet d'embarras et de difficultés pour plusieurs générations."

The originator of the decimal system of coin in America, Mr. Adams himself, and an advocate for a decimal system of weights and measures, observes:—

"It appears also not to have been considered that decimal arithmetic, although affording great facilities for the computation of numbers, is *not equally* well suited for the division of material substances. A glance of the eye is sufficient to divide material substances into successive halves, fourths, eighths, and sixteenths; a slight attention will give thirds, sixths, and twelfths. But the divisions of fifth and tenth parts are among the most difficult that can be performed without the aid of calculation. Among all its conveniences the decimal division has the great disadvantage of being itself divisible only by the numbers two and five.

"The duodecimal division, divisible by two, three, four, and six, would offer so many advantages over it, that while the French theory was in contemplation, the question was discussed whether the reformation of the weights and measures *should not be extended to the system of arithmetic itself*, and whether the number twelve should not be substituted for ten, as the term of the periodic return of the unit. * * * He (Delambre) admits to the full extent the advantages of a *duodecimal* over a *decimal* arithmetic, but alleges the difficulty of effecting the reformation as the decisive reason against attempting it."—p. 70.

Mr. Adams also observes:—

"The experience of France has proved that binary, ternary, duodecimal, and sexagesimal divisions are necessary to the practical use of weights and measures, as the decimal divisions are convenient for calculations resulting from them, and that no plan for introducing the latter can dispense with the continued use of the former."—p. 93.

"Deciding from the verdict of experience, therefore, it is doubtful whether the advantage to be obtained by any attempt to apply decimal arithmetic to weights and measures would ever compensate for the *increase of diversity* which is the unavoidable consequence of the change. Decimal arithmetic is a contrivance of man for computing numbers, and not a property of time, space, or matter. Nature has no partiality for the number 10, and the attempt to shackle her freedom with them will ever prove abortive."—p. 84.

This observation appears to me to be equally applicable to the use of coins as means of barter for the purchase of articles. Mr. Cubitt states that the most convenient subdivision of length appears to be the following:—

"The foot divided decimally as the unit of measure for those who pursue calculations and investigations of a scientific nature, and divided into inches and eighths for all working and practical purposes."—*Rep. Standard*, 1841–184.

Although I do not think a change impracticable throughout the country, should good cause be shown for a change, yet I think the good to be obtained by an extensive alteration would not compensate the evil or difficulties in obtaining it.

A friend has sent me the following example of the disadvantages of the decimal system:—

"1. It will be impossible to obtain a single loaf or a single candle, which are at present bought by the retailer at 13 for the dozen, and sold to the public at one penny each, unless at a loss of 20 per cent.

"2. It will be impossible, under a decimal system of coinage, with 1*l.* as the integer, to ascertain precisely (far less to pay) a month's wages at the common salary of 100*l.* a year.

"3. It will be impossible to pay for a day's labour where the hiring is at the common wages of a pound a week.

"4. It will be impossible to ascertain the exact value of one foot where the price is 1*l.* per yard.

"5. It will be impossible to ascertain the value of 1 oz. troy where the amount per pound is 1*l.*, or the value of 1 lb. at 20*s.* per quarter avoirdupois."

470. (*Chairman.*) Was not the system introduced before Napoleon?—Yes; the Americans first introduced the change, and then the republic of France followed it up; but Napoleon extended it as a badge of conquest in the part of Europe which he subjugated.

471. (*Lord Overstone.*) As you are quoting various authorities on the subject of the duodecimal system, I ask you whether you agree in the authority of the following statement extracted from a treatise published as long ago as the year 1640:—"The number "12, of all the numbers, is the most proper for money, being most clear from fractions and "confusion of account, by reason that of all other numbers it is most divisible, being "divisible into units as all numbers are, into two parts as no odd number is, into three "parts as no even number is but six, and numbers that consist of six; into four parts, "into which six is not divisible; and also into six parts?"—I entirely agree with that.

472. (*Chairman.*) By the duodecimal system that you refer to, of course you mean the entire abandonment of our present Arabian or Indian system, and the adoption of a system which should go from 10 to 12 places?—I do not recommend such a change; but I mean to say, (and this is what they say themselves,) that even the first recommenders of the decimal system did not recommend that system as being the best.

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473. Has any country on earth that has yet been known ever adopted the duodecimal system?—I am not aware of any country having adopted it as a system of arithmetic, but we have applied it to our coinage, and to many of our weights and measures, and thus have obtained many of its advantages without subjecting ourselves to the mischiefs inseparable from all large changes in the habits of the people. I believe that the mass of the people would not have the smallest objection to commercial men making whatever alteration they may consider most advantageous in the mode of keeping accounts; but it is no trifling affair to attempt to alter the money or coin used by the people in their daily transactions, and it certainly should not be attempted without unquestionable proof of great and decided advantages to be derived from the change, and even then not unless it should be unmistakingly called for by the majority of the people themselves. Now, I must own that, notwithstanding the most extensive inquiries, I cannot find the least indication of such a desire on the part of the people, nor any proof of the advantages of the change recommended by the Decimal Association and the Committee of the House; a change as far as the money is concerned so revolutionary in its plan that I doubt if America, in the first effervescence of her independence, or France in the heat of her revolutionary fervour, would have ventured to attempt so radical an overthrow of existing institutions.

Adjourned.

Wednesday, 4th June, 1856.

Mr. T. W. Rathbone.

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The Right Hon. Lord OVERSTONE in the chair.

THEODORE W. RATHBONE, Esq., examined.

474. (*Chairman.*) I believe you have been long connected with the neighbourhood of Liverpool, and have had means of observing the general commercial and monetary transactions of that place?—Yes, I have.

475. Have you also been extensively connected with railway transactions?—Yes, as a director of several railways, from the first introduction of the system.

476. Have you also resided abroad and had the means of observing the monetary systems of other countries?—Yes, decimal systems especially, and where they have been long in use.

477. You have therefore paid considerable attention to the question now before this Commission of the propriety or otherwise of introducing the decimal principle into the coinage of this kingdom?—Yes, I have considered it very deeply for many years past.

478. Have you formed any definite opinion upon the subject?—I have long entertained a very decided opinion that great advantage would result from the safe and sound introduction of a decimal system into this country, and for some time past I have been decidedly of opinion that it is perfectly practicable so to introduce such a system.

479. What do you mean by the safe and sound introduction of a decimal system of currency?—I think it would be only safe and sound, or even practicable, if founded on the existing coins and monies of account. I look upon it that the penny must be the unit and basis upon which you must and may found and practically introduce a perfect decimal system, and that you may do so without any inconvenient interference with the other coins.

480. Are the Commission to understand that it is your decided opinion that the decimal principle ought to be introduced into the coinage of this country?—Quite decided.

481. Will you have the goodness to state the grounds upon which you rest that opinion?—I have always found much greater simplicity, accuracy, and economy of time, with the decimal system, both in accounts and calculations and in the use of coins, and so many advantages arising out of a decimal, rather than a duodecimal, or any other system with which I am acquainted, that I have come to a very decided conclusion in favour of that principle. I believe that the immediate saving of time and labour to the public would be, as demonstrated by the examples I have submitted, such as to reduce the figures required in calculations from a third to a fifth of the present number, in the first place.

482. To what do you allude when you use the words "so many advantages arising out of a decimal system"?—The first great advantage is, that in all calculations, I believe you would require but a third to a fifth of the work, and in addition secure the further important advantage of very much greater simplicity, accuracy, and reduced risk of error, in every kind of operation.

483. Do you think that the decimal system has the same degree of superiority when applied to the division and distribution of material things which it has when applied to purposes of calculation?—I think it would have perhaps even greater advantages in that point of view, if carried out completely, as I propose, as furnishing us a much better and more exact measure of value than we have at present, when applied to material things.

484. Do you think that it is the natural tendency of mankind to divide material commodities upon the decimal, rather than upon the duodecimal system?—I think it is, and that they would always find very great advantage in doing so; and if they had the opportunity fairly given them, that they would always avail themselves of it.

485. How do you reconcile that opinion with the greater divisibility of the number 12 than the number 10?—You have certainly more useful factors in the number 12 than 10,

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but then you have a much simpler and more perfect and useful monetary system in that founded on the number 10, and the same result from extending the principle of our present decimal arithmetic, as I propose, uniformly on through our weights and measures by advancing, in all, decimally from familar and well established units.

486. Is it not the object and purpose of all divisions of commodities, to render the greatest possible equal number of fractional parts in a clear and complete form?—Yes.

487. Do you think that a division by 10 will afford that equal number of fractional parts in an equally clear and complete manner that a division by 12 will?—Looking at the question practically, and in connection with our own monetary system, the decimal division would carry us to a far more exact point in the fractional division of commodities than we have at present, or could have under any other scheme with which I am acquainted.

488. How will you obtain a quarter of anything upon the decimal division, or an eighth or a twelth part?—The tenth of the penny (the cent I propose) would, in calculation, give a far lower and more exact measure of minute values than we have on the present duodecimal division, or than the proposed mil would furnish; two and a half cents would be a quarter of a penny, if required, that is, the present farthing, and these cents of 10*d.* (the French centime,) descend two and a half times lower in the exact measure of minute values than either the farthing or the mil.

489. Suppose you take a pound weight of anything, or any liquid measure, or any measure of length, such as a yard or a foot, do you think that that is divisible for practical purposes into the same number of clear aliquot parts, if divided upon the decimal system, as if it were divided upon the duodecimal system?—Yes, provided you adopt the same system and course of proceeding (as I propose) with regard to weights and measures; but you must introduce the decimal system there also, in order to get the full benefit of it, and I think you may do that also without any great difficulty, on the principle I have proposed.

490. Do you consider, in the opinion which you have given in favour of a decimal coinage, that the accompaniment of that measure by a decimal system of weights and measures is essential?—Not essential, but that it would be a large addition to the advantages. I think that there would be very great gain in a merely decimal system of accounts and coinage, or even of accounts only, and that the rest would then follow almost of itself.

491. Do you think that a decimal division of the coin would harmonize in the practical transactions of the market with a non-decimal system of weights and measures?—It would be a disadvantage not to have a decimal system of weights and measures as well as decimal coins. But if that were the only alternative offered, I would greatly prefer taking even a mere decimal system of accounts, without a legal provision for anything else, to remaining in our present position.

492. By a decimal system of accounts do you mean a system of accounts different from the coinage, or do you mean a coinage perfectly decimal, and therefore involving a decimal system of accounts?—Yes, a decimal form of accounts as distinct from a perfectly decimal coinage. If you adopt a decimal system of accounts only, without any change whatever in our present coinage, I think you would, if it were on sound principles, gain a very great advantage. And when you further harmonize the coinage with such a form of account, with the change I propose of 10 for 12 in our accounts, such a proceeding would, in my opinion, be an enormous further gain both to this and to all other countries, and would infallibly, and easily, I believe, conduct us in the end to all the rest of what we and they require.

493. Do you consider that the gain would consist entirely and exclusively in the saving of time and trouble in calculation, or do you look to any other advantages that would attend it?—Those are the principal and most obvious; but, according to my view of the change required, you might then easily and at once obtain, and bring largely into immediate operation, all the great and recognized advantages of the beautiful French system, through our own pence and tenpence, our existing unchanged monies; and you would, moreover, thus have a purely decimal instead of even the centesimal system of accounts.

494. The object of the last question was to ascertain whether you think that the introduction of a decimal system of coinage into this country is recommended by any other considerations of advantage beyond those of diminishing time and trouble in calculation?—I think, besides these, and the very important advantages I have already mentioned of such greatly increased simplicity and accuracy in all figure work, there would be further very great advantages indeed to be obtained in regard to foreign commerce.

495. Do you mean by reference to foreign commerce in relation to the calculation of exchange transactions?—Particularly that, but also in all our commercial and social relations.

496. If in your opinion a decimal system of coinage is evidently expedient for this country, have you directed your attention to that system of decimal coinage which has been recommended by a Committee of Parliament, and by other authorities, commonly called the pound and mil scheme?—Since the issue of the Report of that Committee in August 1853, I have done so very attentively.

497.—What is your opinion upon the merits or demerits of that plan?—I think it in the highest degree objectionable, both as regards the domestic and foreign objects of a decimal system, and in its entire course of operation and results.

498. Will you state the main grounds upon which you think it highly objectionable?—I think the first objection to the millesimal division of the pound would be, that it would involve a widely extended, mischievous, and altogether unnecessary alteration of our existing

accounts and contracts, of all tolls, rates, postages, stamps, &c., and of all values measured in pence, and the lower British coinage, as well as of much of our coinage itself, when a perfect and really decimal system might be introduced, almost without any alteration whatever of any moment, of either our existing accounts or coinage.

499. Will you explain more in detail what you mean by saying that it would involve a widely extended, mischievous, and altogether unnecessary alteration of our existing accounts and contracts?—In the first place, two of our present three monies of account would be altered, and three new ones would be introduced, giving an entirely new form and denomination to all existing accounts; whilst the whole of the copper coinage and the values it represents must not only be altered in value, but replaced by incommensurable coins, values, and monies of account, that is, by such as will not exactly and definitely measure with the existing, as will not divide without remainder. In addition, a very large and important part of our present silver coinage must be destroyed—the half-crown, in the first place, of which alone we had 37,000,000 in circulation, according to the statement of the Master of the Mint, in 1853; besides which several other of our silver coins are indicated by him, and by the Committee, as requiring to be extinguished; these being some of our most useful coins, with reference to foreign countries as well as our own, our old half-crown being in fact an almost exact three franc-piece, and therefore, as well as our copper coinage, very important with reference to foreign monetary systems.

500. You do not consider the farthing a money of account?—It does not exist in any of our mercantile books or in accounts of any kind, and in my part of the country it does not exist even as a coin—farthings, as coin, being wholly unknown in any part of Lancashire, as well as in a great part of England; and it was in evidence before the Committee of 1853, that its introduction into our accounts would be highly objectionable. I consider the only three recognized and existing English monies of account to be pounds, shillings, and pence. Of those three, a system founded on the mil would destroy two, and replace them with three new denominations, requiring a new and highly objectionable form in all our accounts, as well as the change of our monies of account, of which three would be new, and two incommensurable with the existing monies of account, and with a large portion of the coinage.

501. Which are the two that are incommensurable with existing monies?—The cent and the mil; the mil which is the foundation of the whole, the unit or basis of that system, and the cent which is 10 mils.

502. Do you consider that the following qualities are essential to any sound and safe system of decimal currency. 1st. That it should be free from any liability to cause injustice or confusion among the poor and illiterate classes of the community, and thereby create a prejudice against its use?—I have a strong and very decided opinion upon that point, and it is upon that ground that I chiefly entertain a very strong and insurmountable objection to the mil system, and consider it to be impracticable.

502a. 2ndly. That it should not necessitate the withdrawal of the copper coins already in use, especially those of the lower denomination, and which from habit every one is familiar with?—To that position, also, I entirely and cordially assent.

503. 3rdly. That it should possess great facilities for expressing its coins in the old money, and conversely?—I entirely assent to that also, as most essential.

504. 4thly. That there should be but few monies of account, and those of a convenient size, and that, if possible, each money of account should be of a separate and different metal?—With a strictly decimal system, there can of course be but two monies of account united by the decimal tie, or number ten, and they must be of convenient size for the highest and lowest monies of account in ordinary use; but I don't see the absolute necessity that each money of account should always be of a separate and different metal. In no decimal system that I am acquainted with has it been found practicable long to maintain more than two monies of account in ordinary use, and the attempt has been unsuccessfully made both in Europe and America.

505. Do you think that there would be a convenience in having each money of account represented by a separate metal?—Yes; I think that there would, but not any absolute necessity for this being uniformly the case.

506. Those four difficulties correctly represent your main objections to the parliamentary scheme as now proposed?—Yes, in its domestic point of view.

507. To what other point of view do you allude?—To the difficulties that it interposes to an international monetary arrangement, and generally to commercial social intercourse with foreign countries.

508. Will you explain more in detail what the difficulties to an international monetary arrangement are to which you allude?—I will more particularly refer to Canada and the United States as an example, for it is obvious, that if we had the tenpence as our money of account, and that tenpence was precisely similar in amount of metal and intrinsic value to the franc (and there is only about three per cent of difference between the two at present, and we may employ without a difficulty or disturbance of any kind the less than two grains more of silver required to render these coins identical), there would be a great and obvious advantage in having all our silver and copper coins gradually identical and international with those of France and Europe generally. I would wish, therefore, more especially to call attention to an important view of this question in relation to our North American colonies. Canada is anxious and impatient to adopt and acquire some of the benefits of a decimal system, and the legislature is almost unanimous in wishing to adopt the monetary system of the United States, dollars and cents. The mother country has, I believe,

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vetoed that proposition, and has refused to allow Canada to adopt the dollar and cent system, probably on political as well as commercial grounds; but the state of public feeling and opinion in Canada will no doubt render it necessary to consent, without delay, to *some* decimal system in that country. The United States appear to contemplate and have urged on their legislature in a manner that cannot but be influential, making the dollar an exact five-franc piece, in order that their monetary system may entirely and exactly coincide with that of the "Systême Metrique;" and the fifth of their dollar being 69·11 grains of pure silver, and the French franc of 5 grammes, 69·4, there is at present only this very slight difference between them, and without at all abandoning the system of dollars and cents, the two monies would thus be rendered international, and the exchange would become an exact per-centage calculation on identical coins. If then, we let the Canadians adopt the dollar and cent system, we should still, with our tenpenny or franc, be in perfect correspondence with them, and ultimately all other countries; and if, on the other hand, we require them to adopt and adhere to our system, with the tenpence I propose, they will still not suffer the inconvenience of any isolation and want of uniformity in monetary arrangements with their American neighbours or with the great European system. But if we do *not* adopt pence and tenpence as monies of account, but the mil system, and Canada adopts the dollar, we should be seriously impeded in our monetary communications with them; and if we force upon them the mil system, they would be seriously interfered with in their monetary communications with their neighbours, and the most serious consequences might result from such an attempt. Mils and cents, and the millesimal form of account, are necessarily incommensurable with pence and tenpence, or francs, with dollars or fifty pence coins, and with all other existing monies, both of account and circulation, and must therefore necessarily create the greatest intricacy, embarrassment, and difficulty in the calculation of exchanges, and in all international monetary operations whatever.

509. You think that, in any effort to introduce a decimal system of coinage into this country, our attention should be studiously directed to the object of rendering the coinage coincident, or nearly so, with the existing decimal coinage of the United States, and that which will probably become the decimal coinage of Canada?—Yes, as well as that of Europe, for the franc, the florin or double franc, and the German gulden, (which, it would appear, is in future to be struck an exact 2½ franc or half-dollar piece,) would all fall under the same category; the florin being already very nearly two francs, and the proposed gulden of Austria, and dollar of America, becoming exactly two and a half and five franc pieces.

510. Have you formed in your own mind any opinion as to a specific scheme by which that could be most properly accomplished?—Yes; I think we might, without any sort of inconvenience, concede to France, and all the other European and other nations using the franc and its aliquot multiples, and the great metrical system generally, that all our future silver and copper coin should be strictly coincident in intrinsic value, as that of the United States probably will be soon, with the franc and its multiples and decimals, obtaining in return, if possible, the general adoption of gold as the standard of value, as is now already the case in the United States, after a long practical experience of both metals. This is what I proposed in my scheme brought before the public in an "Examination of the Report, &c. of the Committee of the House of Commons" in 1853; and what I could then only suggest as probable and very desirable with reference to the half-franc or tenpence as a universal integer, and key in every coinage, is now fast becoming a *fait accompli*.

511. What is the system of decimal coinage which you think ought to be introduced into this country?—Simply and solely the adoption of tenpence instead of twelvepence as our money of account, (the decimal point always dividing the pence and tenpences when used instead of a ruled column,) and the gradual introduction of more strictly corresponding coins, in addition to those which already correspond, (such as in fact almost all our present coinage, copper, silver, and gold); issuing, that is, as found convenient by the poorest classes, one to five cent (or halfpenny) coins, and fivepenny and tenpenny, &c. So that we should select, and permanently employ, the coinage found most convenient, from a range of cents 0·1 to 0·5 (the halfpenny), ten cents (or pence) ·1; three, four, five, six, ten, and twetve pence, ·3, ·4, ·5, ·6, 1·0, 1·2, (the shilling); two, three, five, tenpenny pieces, &c., that is, 2· (the florin), 3· (the English half-crown, or 3 franc piece), 5· (the dollar), 10· the double dollar; 12· (the half sovereign), 24· (the pound), 25· (the old English guinea nearly), 50· (the American eagle), as the gold coinage.

512. Do you mean that you would adopt a decimal system of coinage consisting of a penny as the lowest unit, of tenpence as the first multiple, and 100 pence as the second multiple?—No; that last proposition of 100 pence as a money of account in place of the pound, is a modification of my proposal, which I think highly inexpedient, and equally that of abruptly and compulsorily abandoning the pound altogether as a money of account; but coins of 100 and of 250 pence, and bank notes of 1,000 pence (4*l.* 3*s.* 4*d.*), might probably, I think, be found very useful.

513. Will you have the goodness to state what is the decimal system of coinage which you would recomend this Commission to sanction?—I urge, and have always urged, simply the adoption of the tenpence in place of the twelvepence as our money of account in place of the introduction of corresponding coins, coincident in value with the franc, and its multiples and submultiples, and thus ultimately with the florin, gulden, and dollar system of currency.

514. What would be your lowest money of account?—The penny.

515. What would be your highest money of account?—In all ordinary accounts, and in all calculations, tenpence; but for the expression of large amounts, and to avoid abrupt and

inconvenient change and confusion in mercantile books, and in national finance, and as our legal tender and measure of value, I should still retain the pound.

516. How do you reconcile the retention of the pound with the decimal system, the pound not being a decimal multiple either of a penny or of tenpence?—I believe that in all ordinary operations, and in all our calculations, we should very rapidly come to work exclusively with pence and tenpence, and we should, of course, do so at once and entirely, with all our smaller accounts up to 20*s.* or 240 pence, and we should thus at once entirely get rid of our present duodecimal *addition*. Pence and tenpence being two monies of account practically demonstrated by experience (our own as to the penny, and European as to the tenpence) to be the two most useful and perfect, as highest and lowest in the scale; and being united by the strictly decimal tie, which I conceive to be the only real and true decimal system, must, I think, easily and rapidly come into general use to the utmost extent found desirable. We have entirely discarded halfpence, farthings, and all monies below the penny, in our accounts, and though additional European nations, (as all the Swiss cantons recently) voluntarily adopt the franc or tenpence, as unapproached in convenience and simplicity, none ever abandon it, after any large experience of its merits. Millesimal and centesimal systems have no doubt their merits, and may, in some cases, be better than duodecimal, but even these are not strictly decimal. A strictly exact decimal system can of course only consist of two monies of account, united by the decimal tie, that is, 10, not 100 or 1,000, which existing between the two ordinary moneys account, may connect a mil unit with the pound by decimal steps, but, as only two moneys of account can remain in ordinary use, must result in a millesimal not a decimal system. The two moneys of account for ordinary use, would, in my scheme, be pence and tenpences; but the use of the pound as a money of account, might I think, with advantage, still be legal; and I should expect that it ever would be of use, and very conveniently used, as the recognized expression for large amounts, and in comparative financial and statistical statements; and that it would remain, as at present, the principal gold coin, and the standard of value and legal tender in payments above forty shillings.

517. Upon the supposition of large amounts being still stated in pounds sterling, how do you conceive that the advantages in calculations, supposed to attend the decimal system, would be realized?—I think the practice of stating any amounts in pounds, from this very inconvenience of having to multiply pounds by 24, for calculation, slight as this would be, would disappear to a large extent, and gradually almost entirely; all accounts up to the pound would at once be in a strictly decimal form, that of pence and tenpence, that is, all the accounts of the humbler and less instructed classes of society would be, at once, purely decimal, and the duodecimal addition would at once entirely disappear, and all bills and ordinary statements of amounts would soon, I think, fall into this beautiful and perfect decimal form of pence and tenpence. The pound might remain for a time, and during pleasure, in account books, so that you would not require to alter the forms and figures of every description, in all the vast multitude of books and accounts all over Great Britain, &c., and all at once, but pounds, tenpence, and pence (*£ x. & d.*), would gradually disappear, and pence and tenpence, divided, at pleasure, by the decimal point, or by a ruled column, would be more and more largely the sole ordinary monies of account, and the pound would be confined to the expression of large amounts.

518. Is it not the fundamental principle of a decimal system of coinage, that the numeration of all amounts will strictly correspond to the Arabic system of notation, which we apply to pure numbers?—Yes, certainly.

519. How can you introduce into a decimal system of accounts so defined, the pound sterling, which is not an Arabic multiple of your unit, of a penny or tenpence?—You certainly cannot, and in so far as the pound is retained in practical use in accounts, you no doubt make an exception, and admit an irregularity; but I conceive that it is one which would imperceptibly, quietly, and without any material inconvenience or disturbance, disappear, and it would end in the sovereign becoming as a 24 franc gold coin, much what the 20 franc Napoleon is in France, the 25 franc Leopold in Belgium, and the 50 franc Eagle in America; that is the great gold coin, and that in which large amounts might ever be conveniently expressed. In France prices are sometimes named in Louis, sometimes in Napoleons, sometimes in crowns, and sometimes in the petit ecu or half-crown, although the franc is the sole legal money of account, with little inconvenience to any one used to these expressions of multiples of the franc, and such would be still less the case with one recognized large money of account, such as the proposed pound of 24 francs, with all the useful factors that number undoubtedly affords.

520. Do you mean, in the system which you propose, that all public accounts and all private accounts in which large sums are stated, should be stated, as is the case in France, in the tenpenny unit?—I would leave it to experience and the inclination of the public, to decide the extent desirable in practice. I would leave both the chancellor of the exchequer, for instance, and whoever had to deal with monies, large or small, to act upon their own judgment and experience, in regard to the mode in which accounts should be stated, and sums of money expressed. I am satisfied that when you could make a calculation with less than a third to a fifth of the figures, in addition to the clearness and saving obtained in every addition, and even, as shown by Mr. Minasi's tables, in the first expression or writing down of figures, this would soon lead people into general use of the pure decimal system, pence and tenpences, but it had better, I think, come about thus gradually and tentatively.

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521. I wish to draw a clear distinction between the system which you propose, as a desirable system, and the compulsory adoption of it. Looking at the system which you consider desirable and expedient, am I to understand that it is a system in which a penny would be the lowest unit, and tenpence the highest unit, and that you contemplate that public convenience would rapidly conform to that, and that all large amounts would be stated in the tenpenny integer of account?—No; I think that you would always retain the pound, to some extent, for the convenient expression of large amounts, as well as its other objects.

522. How can the advantages of a decimal system, which consist in its strict conformity to our present Arabic notation of numbers, possibly be obtained in a system in which the pound sterling, which is not a decimal multiple of the penny, is still extensively used?—All the advantages of an entirely pure decimal system you certainly could not, for where any use of the pound exists, and however the pound sterling is in any degree used, you would be only able to get at strictly decimal figures by the multiplication of the pounds by 24; certainly not a difficult or troublesome operation, and which, I apprehend, would soon be quite the rare exception, in all the ordinary figure work of the country.

523. Have you ever drawn out any account in which the existing numeration under our present system is converted into a numeration under your proposed system, beginning with the penny but still including the pound sterling?—I have given such examples in the first pamphlet which I published on the appearance of the report of the committee of the House of Commons in 1853.

524. Can you lay before this Commission any such example?—Supposing a person instead of ten guineas, as at present, were to ask me 10*l*·12 (10 pounds and 12 tenpences) I should of course at once know that he meant 252 tenpences; and if I had any calculation to make, I should write down 252· for the purpose.

525. Is not that then the abandonment of the pound sterling in your accounts, and he adoption of the penny as the lowest unit, and of the tenpence as the highest unit?—Practically, I think, it would come to that, and that it is most desirable that it should come to that, in all the ordinary figure work of this country.

526. Your system then involves altogether the abandonment of the pound sterling, as a money of account?—Not altogether. I would leave it in that position as long as people liked so to use it, and to the extent that they liked so to use it, and found it practically a convenience. In practice, I do believe that our accounts certainly would, in all ordinary cases, resolve themselves into the strict and pure decimal form of pence and tenpences; but I have observed in foreign countries, with decimal systems, inconvenience from the want of a generally recognized expression of a larger money than ever has existed, or possibly can exist, in strictly decimal accounts; and I think that we should find great convenience and advantage in having *one* recognized well established expression in our pound (our principal gold coin and our legal tender), whenever large sums made its use a convenience.

527. Whenever you wished to write down large sums, and to write them down one under the other, do you think that if they are written down in pounds sterling the advantage of simplicity in calculation to which you allude, as a merit of the decimal system, would still be obtained?—Not perfectly. You would then add up with the transfer of the tenpences to the pound column, which would not be a decimal step, though not one of any difficulty. You might easily do this, and then work your calculations with perfect decimals, turning the pounds into tenpences, by multiplication by 24.

528. If the system involves, first of all, an addition, and after that a calculation, to convert the sum so obtained by addition into a statement stated by some other numerical system, will not that generate inconvenience, difficulty in calculation, and liability to error, much greater than exists under the present system?—That operation takes place already, with much more difficult circumstances, and with an infinitely greater number of accounts, than we should ever then have to deal with. At the Bank, and elsewhere, all their immensely numerous accounts both above and below the pound being so treated to get at a less perfect decimal system, and when they have all to be again re-converted into *£ s. & d.* We should never have to do this with anything below the pound in amount, on the system I propose; and it is surely evident, that with such large inducement to use another system, and facility in its use, monies would not generally be written down and expressed in pounds, tenpences, and pence, but in tenpences and pence, and by degrees so generally as to make the use of the pound quite the exception.

529. Your view comes to this, that the system would be one very closely analogous to the French system, taking the penny for the lowest unit, and the tenpence for the highest unit, and that in the great mass of cases all large amounts would be written out in the tenpenny unit?—It probably would come to that, but we should have some important advantages over the French; their old and established copper coin, the sou, not being decimal relatively to the franc as our penny would be, they have had great difficulty and long delay in carrying out their decimal system, and have after all been obliged to be satisfied with centesimal monies of account. It has been a struggle of upwards of half a century to get rid of their old copper coin, the sou, in their accounts, and the object is not yet quite perfectly accomplished. Our transition, on the other hand, would be, to a great extent, instantaneous. The very day that you introduced tenpence as the money of account, in place of twelve, you would have the decimal system perfect, at all events up to the pound, and the duodecimal addition of the pence entirely exchanged, in all cases, for the decimal. In parts of France

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remote from the capital, you still meet with accounts in the old copper coin, the sou, and even in Paris this practice has not been very long entirely prevented, though it long has been illegal; the sou being a non-decimal coin.

530. What do you mean by the sou being a non-decimal coin?—A sou is not the tenth of a franc, and francs and centimes are now the legal monies of account in France; the obstinate invincible adherence of the people to their old copper coin, the sou, and the uniform impossibility of keeping, in ordinary use, more than two monies of account with any decimal system, having rendered the attempt to introduce the décime or penny a failure.

531. How many centimes make a sou?—Five.

532. Therefore it is a fraction of a decimal?—Yes; but our penny is at once a ten cent (or centime) coin, and money of account.

533. Do you agree in the strong opinions that have been given, both by the Parliamentary Committee and by high scientific authorities, of the impossibility of abandoning the pound sterling as our highest integer of account?—I think that they have overstated the case. I think that we might retain all that is good and advantageous in the pound as a money of account, and that it would be desirable to do so; but I do not think that the entire abandonment of the pound as a money of account would be impracticable, or attended with that extent of inconvenience which some of them have stated.

534. What is your opinion with regard to the question of introducing the decimal system according to the recommendation of the Parliamentary Committee, or remaining with the system which now exists. Which do you think the preferable course of those two?—I should greatly prefer to remain as we are at present. First, because I think that such a system would be extremely mischievous; and secondly, because I think that it would be found impracticable, and that the attempt to introduce it would bring great discredit on the decimal system generally.

535. Do you think that the introduction of the decimal system in the form recommended by the Parliamentary Committee would not secure to any adequate extent the advantages anticipated from a decimal system?—Not by any means so perfectly as a pure decimal system, and not to a sufficient degree to warrant the inconvenience, injury, and injustice that it would cause.

536. You think that the advantages to be obtained under a decimal system, in the form recommended by the Parliamentary Committee, would not be sufficient to justify attempting the change?—Decidedly not; I think that it would be mischievous, not beneficial, though I do not question certain benefits from any kind of decimal system whatever.

537. (*Mr. Hubbard.*) Among the objections which you have made to the system proposed by the Parliamentary Committee is this—that the coins which would be introduced would be non-exchangeable with those which we at present possess?—Yes.

538. How long do you think that that objection would weigh. Is it one which you conceive to be of a permanent character or one which would only operate during the transition state from one system to another?—I think it would be of a very permanent character. The period of twenty years named by the late Master of the Mint, Sir John Herschel, for the complete exchange from the one currency to the other, as regards the coins, would, I think, prove much too short, though he had evidently well and carefully considered the question. I have been very much struck with the extreme tenacity with which people, the lower classes in particular, ever cling both to their familiar and established coins and values. It is proposed, and necessarily on the mil system, to alter the value as well as the coin of our entire copper coinage; and I think that extreme and obstinate resistance would be encountered, and that the attempted change would be of a permanently injurious character, from the impossibility of ever making it thorough and perfect, and from existing values being incommensurably and most inconveniently disturbed at home and abroad.

539. The time required for exchanging the whole of the existing currency for the whole of any new currency does not appear to me to be an illustration of the difficulty which undoubtedly does arise from the non-exchangeability exactly of one coin for the other. I have assumed it to be rather in questions of payment in the new coin, of debts incurred in the old, or of the recording under the new coinage system entries which had been made previously under the old. That I take to be the largest and the most important application of the difficulty to which you are alluding, and that difficulty, I presume, such as it is, you would admit, passes away with the transition moment. When the payment of the debt is once made, and when the entry of the sum is once made, the difficulty, however imperfectly disposed of, is still at an end?—It is in that one case of a specific debt, but not in that of a toll or rate, &c.; and the operation is wide and extensive and not confined to our own country, and the continued inconvenience of a mixed currency, consisting of sets of coins incommensurable with one another, is surely of itself another very serious continued inconvenience and injury to the people having to deal with it. The loss, too, would be almost always against the buyer, I think. The seller being the stronger party, and not being able to give the difference, would make the buyer the sufferer.

540. That would depend very much upon the authority of the system under which the exchange took place. The Government may dictate, as they did upon the question of the conversion of the Irish currency, the terms or proportions in which the new currency is to supersede the old?—A poor man wants a penny roll or any article valued in pence; and he would receive for his shilling ten five-mil pieces, instead of the present twelve pence. He

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offers one of them, and ought to have something out, but he can have nothing out, and I think the seller would generally be able to make him the sufferer, and oblige him to submit to the difference against himself; and the Government could not possibly dictate to sellers to give out that which would not exist, and therefore could not be given out.

541. If the pennies have been called in and cents and mils are the substituted silver and copper currency, people will hardly talk of a penny roll. It will be a four-mil roll or a five-mil roll. The roll will be accommodated to the price charged?—I am afraid that it would take a very long time to accomplish this substitution and exchange. The lower classes, in particular, cling obstinately to known established values and prices; and they would not want the five-mil and would not like to take the four-mil articles, but would still go to those shops where they could receive the exact value of their pennies, so long as our 5,000 to 6,000 tons of copper coin existed.

542. Assuming that the circumstances under any change that takes place are such as to induce the holders of the old copper coin to exchange it for the new, what would be the result?— I really do not see how this can ever be perfectly accomplished. The period of twenty years is estimated by Sir John Herschel as the time required to accomplish the change; and it would, I think, require at least that to get in all the old coin and exchange it for new; but I should expect it to require much more to accomplish the change perfectly and entirely, for you ever find coins and values existing for long after they have been done away with by the law, both in the pockets and the minds of the people.

543. Then your objection is measured in its extent by the period which you attach to the necessary process of exchange?—That one single species of inconvenience, which has been indicated, of course, would then disappear; but all the others still remain, and as regards all other countries, for ever.

544. Again, you objected, as one disadvantage arising from the pound and mil system, that the half-crowns would be superseded?—Yes; that is proposed by the Committee and Master of the Mint, and generally by the advocates of a mil currency.

545. Do you see any reason why they should be superseded, and why they should not still circulate, if they are found a convenient coin?—I think they would not be a convenient coin with mils and cents; there would be an awkwardness in taking them and giving the change out. They are a very convenient coin with the penny and tenpence, but they would not be so with mils and cents.

546. If they were found inconvenient their withdrawal would not be regretted?—No; not if you had a currency that rendered them an evil, but as they are 37,000,000 in number it must even then take long to accomplish.

547. If they were, on the other hand, found convenient, they might be retained?—Yes; if found convenient, but this they obviously could not be, with 125 mils as the change; and it would be still worse, whilst the currency was mixed, and until a suitable and uniform new coinage was established. 700,000,000 of new pieces must be coined, issued, and exchanged, according to the undisputed evidence and estimates of the Master of the Mint, in order to replace the old coinage; and in rates, and tolls, and all values of that kind, measured in pence, the evil would after all be permanent and incurable.

548. In addition to the domestic difficulties which you associated with the introduction of the pound and mil system, you stated that you conceived it would have a further disadvantage with relation to our exchanges with foreign countries?—Yes; very serious indeed.

549. Have you had much experience in exchange operations yourself?—Only as a traveller, never commercially. I have a good deal of acquaintance with merchants, and have learned a good deal from them on this subject, but I have no experience practically of foreign exchanges as a merchant.

550. Are you aware that exchange operations are never made for very small sums, but are generally made in bills of considerable amount in commerce?—Yes, generally, I believe; but in travelling, one cashes very small bills sometimes.

551. What is the smallest bill that you are aware of ever having circulated as a traveller?—I think that I have cashed a 5*l.* note, but I am quite certain that I have often cashed a 10*l.* note.

552. A 10*l.* note is a very ordinary bill?—Yes, a very ordinary species of money at home and abroad.

553. Are you aware that any difficulty is found in cashing a 10*l.* note in France at the present moment?—I believe none whatever. There may be the difficulty of not always knowing exactly what the exchange is, and being cheated by innkeepers and in out-of-the-way situations; and if you had no calculation to make but the simple exact per-centage of exchange on identical coins in different countries, I think you would not be so often and so easily taken in by bankers and innkeepers, or whoever happens to cash your bill.

554. In what way would you protect yourself through any other system against the possibility of being cheated in the negotiation of a bill?—A simple notorious per-centage exactly marking the exchange, instead of this per-centage of exchange being as at present mixed up with the relative value of coins, (like those especially founded on the mil, which are not commensurable, and therefore not exactly exchangeable with any other coinage whatever,) would be published in every newspaper, and an innkeeper or banker would not then dare to offer anything but the announced exact and well-known per-centage of exchange. This can only be with coinages coinciding, and especially exchanging without a remainder which cannot be expressed and measured.

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555. Are you aware that there is no Paris paper which does not contain, every day, the quotations for exchanges of bills on London, so that any traveller can know what is the rate that he ought to receive, allowing, of course, for the profit of the exchange dealer?—Yes, as regards Paris exchanges but if you bring in the question between the mil and the franc, or any other foreign coinage, all of which would be incommensurable monies with mils, there would even there be the same difficulty as between the buyer and seller in this country. There is a something that you cannot measure between the two coinages, and which would be almost inevitably lost by the traveller, and secured by the least scrupulous and honest of the two parties, travellers or merchants, in all cases; and surely it would be greatly more simple and intelligible if all you had to look at were a simple per-centage exactly indicating the exchange between monies that were identical—or, at all events, exactly commensurable. The identical community of silver and copper monies would be certain, I conceive, to lead to a common standard of value, and that thus the gold standard of this country and of America would, ere long, be universally adopted; especially if we, in common with the United States and Canada, stipulated for this concession from France and other European states, in return for the exact adoption of their silver and copper coinage. I beg to state distinctly that the scheme I propose has no tendency whatever to any kind of alteration in the present gold standard of this country; nor have those who are its advocates, even those who have suggested abandonment of the pound as a money of account, or substitution for it of the imperial of 100 pence in accounts, ever once, that I am aware of, suggested any alteration of the present legal standard, or reduced use of gold coin. France appears quite disposed to re-consider the metrical system, with a view to its easy general adoption, and has but to make the gold Napoleon, instead of the silver franc, the legal tender, when there is no premium on either, at once, and without difficulty or opposition, to place the two countries, and a large portion of the globe, in entire and perfect international arrangement with regard to money, and to give security, and ultimately the immense boon of universality, to our favourite, and in many respects admirable, gold standard of value.

556. This question must be argued not with reference to what may be the course taken by France or America, but with reference to the existing state of their coin, and their standard?—Yes; and therefore we can at present only assume, as regards France, the perfect practicability of international and exactly coinciding silver and copper coin.

557. The standard of value in England is gold—the standard of value in France is silver?—Yes.

558. Will you therefore explain how the adoption of a tenpenny-piece, which, by approximating to the franc, makes it nearly of the same value, would assist you as a traveller in negotiating your bills upon London?—I do not propose approximation, but entire identification; that the English tenpence and the French franc, with their multiples and decimals, shall be exactly the same monies in regard to the quantity of silver and copper which they shall contain, and that the corresponding form of account be legalised. There is no doubt at present the difficulty with regard to the gold and silver standards to get over in settling the question between England and France. But I have a strong opinion, from all the communication I have ever had with foreigners, that this difficulty would be easily overcome if the attempt were made, and it has already disappeared as regards America.

559. You propose for the English unit a tenpenny-piece?—The unit I should call the penny.

560. That is the lower—the higher is tenpence?—Yes, these would be the lower and higher ordinary moneys of account.

561. Do you know the exact value in England of the franc?—I think they commonly give you about 9½*d.* for it in this country, though in intrinsic value it is often equal to the shillings you receive in payment.

562. How, therefore, will the difficulty between 9½*d.* and 10*d.* assist the operation which you wish to effect, namely, a perfect uniformity of currency; is not it clear that a mere approximation, leaving a margin not merely of five, three, two, but even one per cent., would be a greater embarrassment to travellers and exchange relations than a larger one which is not lost sight of?—I do not propose approximation, but that our 10*d.* be an exact five grammes of silver in England as in France, and the two coins, therefore, absolutely and identically one and the same thing. Even at present our sovereigns circulate very currently over Europe, and are a favourite coin, from the high character of our mint; and surely silver and copper coins, identically the same, and issued by mints of high and established character, like those of England and France, would in all countries bear exactly the same value, as circulating coins, and only become subject to the altered value caused by the exchange when employed in payments, as a mercantile commodity, and then of course they would bear a defined relative value in different countries, as all other commodities and articles of commerce.

563. You propose not to make the tenpenny-piece a twenty-fourth part of the pound sterling, but to make it equivalent in actual value to the franc?—Still representing in value the twenty-fourth part of the pound sterling, exactly as it does at present. It now is, and must ever continue, a token—the gold sovereign being the only legal tender in payments of more than forty shillings. Whether our 10*d.* were to consist of 67·27 grains of silver as at present, or of 69·4 grains as the French franc, it would equally represent and circulate as the twenty-fourth part of the pound sterling in this country.

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564. You propose to diminish, as compared with the pound sterling, the value of that tenpenny-piece; instead of its being worth 10*d.*, the twenty-fourth part of a pound, you would reduce it to the value of 9½*d.*, in order to be of the same value as the French franc?—No; I propose it to be of exactly the same value as at present, relatively to the pound, but consisting of about three per cent. more silver, or the European coin of about three per cent. less. To us it is a mere question of coinage, leaving relative values quite unaltered. Our coins would coincide in intrinsic value, and be of precisely the same metal as the French franc, and the double-sou piece, or penny, which they actually are very nearly at present.

565. The standard of England is gold, the silver coin of England is a mere token?—Yes, no doubt; the gold, not the silver or copper coin, being the legal tender.

566. It consists only of about nine-tenths of its current value, the price of silver being about 5*s.* 1*d.*, that is, 61 pence. An ounce of silver is really coined into 66 pence, so that our silver money passes for about one-tenth more than its intrinsic value?—Yes.

567. In France, on the contrary, silver is the standard?—Yes.

568. How is it possible for the silver token of one country and the silver measure of value of another country to pass indifferently in either country exchangeably?—Because they would be identical. Whether the franc or tenpenny piece was struck in the French Mint or in the English Mint it would be precisely five grammes of silver, and surely, therefore, the coins would circulate internationally, if confidence was felt in the mints of issue, wherever situated.

569. (*Chairman.*) How can you expect permanently to preserve any such identity between two independent countries?—We see it actually in operation, and strict uniformity of coinage long and scrupulously preserved already, and if internationality was general there would be the strongest motive for strict adherence to the established standards; and then the coinage of a mint about which a question could arise would cease to circulate, even in its own country, and be treated as base and bad money, and the manufacture of money be lost to that country.

570. What permanent security could you have either for the fineness of the metal or for the exactitude of the weight being preserved between two independent countries?—The extreme facility of ascertaining this, and the importance and the necessity of character to Mints. If any Mint did not strike its money of the full weight and standard fineness, it would at once lose character, and its money would only pass by weight, and after examination of its fineness; would not only cease to circulate internationally, but probably be superseded as coin even at home. With mints of high and established character there could be no danger from this cause, and without such character the issue of money would be impracticable.

571. I do not refer to a fraudulent alteration of the coin of either country, but to an alteration by public authority either in the fineness of the metal or the weight, and therefore an avowed alteration involving no discredit. How can any one country calculate with confidence upon other countries not so deviating, such alterations of the coinage having been found of continual occurrence in every country of which we have the history?—Such arrangements being in operation it would become most cogently and emphatically the interest of the countries which had adopted them not to abandon them by deviating in any degree from the agreed standard weight and fineness of the coins, nor can any sufficient motive to do so be conceived. The United States are seeking for this exact identity of coinage with the great metrical system, by making their dollars, in the words of Mr. Mann, exact five-franc pieces, "la pièce de 5 francs du poids et *de l'alliage* actuels," anxious to alter their whole silver coinage in order to acquire it; and when this important result had been also accomplished in Great Britain, and in Canada and her other colonial possessions, as well as throughout the greater part of Europe, no country would be so insane as to throw away such an advantage, and throw themselves out of gear with the rest of the commercial world. No alteration has ever taken place in the weight or fineness of the French coinage since France possessed a coinage founded upon sound principles. The franc, struck in the mints of different and independent countries, already circulates internationally, and continues to do so increasingly and more extensively.

572. (*Mr. Hubbard.*) Would not the result of the arrangement which you have proposed be this, that with one pound sterling you would buy 25 francs, each of which would therefore cost you 9⅗*d.* If you buy them in France and bring them over here, according to their system they would pass for 10*d.*, you would therefore have a large profit upon the importation of French silver, and our own silver would of course be driven out of circulation by it?—When francs were brought here, not only as silver bullion, but as coin well known to be altogether identical in intrinsic value with our own silver 10*d.*, there could only be the exchange on them as bullion, as on all other commodities differing in value in different countries. As coin they would be identical, but if silver was rendered by the course of payments, &c., more valuable in France than in England, of course it would then command a higher price there, and if not, the reverse. The coins being the same, and therefore altogether mutually commensurable, you would simply have to consider the exact per-centage of the exchange arising out of their different mercantile value as commodities and instruments for effecting payments.

573. Then you must either give up passing a silver currency at a gain of one tenth, which you do now, or you must alter your gold standard?— The alteration which I should hope, and fully expect, would be that the French would adopt the gold standard, as the Americans have done already.

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574. With reference to America, you imagine that they would make the dollar worth five francs?—Yes, I do. An exact five franc piece, 69·4 grains instead of 69·11 grains of pure silver. It is what I suggested when I proposed my scheme in 1853, and it is now proposed by themselves, solely to secure a coincidence and identity between their coin and the French and other continental nations, and would of course be still more eagerly desired if this slight change at the same time held out a similar boon as regards Great Britain and her dependencies, by our adoption of the tenpence, or franc as it would soon be rendered.

575. And that assimilation of the United States to the French silver currency would be a reason for us to adopt the tenpence here?—Yes, a further most important reason.

576. Are you aware that the only legal tender now in America is gold?—Yes, and that it has become so after a gold and silver standard had been fairly and fully tried in the United States.

577. And by a very recent edict, so late as 1853, they have deposed silver from its former function of a measure of value, and have made it what it is in England, a token?—Yes; and I consider this a most important consideration in the settlement of this question. Previously to that edict silver was, concurrently with gold, a joint measure of value in the United States; now they have but one, and that is gold.

578. The recent experience therefore of what America has done holds out no expectation that they would return again to silver as a standard?—I should think and hope not. What I anxiously desire is that all other countries should adopt the one gold standard, and thus render it a universal measure of value. The United States having already done this is a strong additional ground to hope that the French and other European nations will, ere long, likewise join in so important an arrangement. It requires but simply to render the Napoleons and Leopolds, or whatever may be the gold coin of the country, the legal tender in payments, instead of the silver coin; and when gold and silver coins, as often, exactly correspond in value, there is no injustice to any one.

579. If the gold standard becomes universal where is the object of assimilating the silver value, and the silver currencies of different states?—In order to render our entire coinage perfectly international and interchangeable.

580. Where is the advantage of that to a traveller?—To a traveller whose course has been the Rhine, or through the different Cantons of Switzerland, (before they all wisely adopted, as they now have, the French coin as a common uniform currency,) and many parts of Italy and Germany, if without a courier, or even settling with your courier, if not delivering yourself blindly into his hands, a change of money four or five times in the course of a day's journey will surely be found a great disadvantage, and very serious troublesome annoyance, to say nothing of the far greater injury in a much higher point of view, of whatever impedes and interferes with the free and unrestricted mutual intercourse between nations.

581. What is the advantage that is to result from the interchangeability of English silver coin with French or other continental silver coin. As no one need leave England with more than a certain number of shillings in his pocket I do not see that he incurs any very great difficulty or disadvantage by having to change his gold pieces into the silver of the country which he is visiting?—The traveller has to change his ideas and measures of value, as well as his shillings, and although the French monetary system corresponds so closely with our own, and all the difference is so largely in its favour, that in passing into France the disadvantage is not so greatly felt, and rather indeed on your return, to the mortification and annoyance of your own, it is surely not pleasant or desirable to have an unnecessary change of money and accounts; and if we unhappily adopted a wholly incommensurable coinage, such as that founded upon the mil, instead of the penny or double sou, and tenpence or franc, even in going into France the inconvenience would be sensibly felt.

582. Would the entire assimilation of a silver currency of the two countries maintain an equal similarity of value in matters of exchange between their larger operations?—No, you want the uniform gold standard; and the arrangement is not perfect without the gold standard being generally adopted in Europe as well as America.

583. And even if the gold standard were adopted would the rate of exchange be invariable?—No. I hope a great deal from free trade in equalizing values and supplies of all commodities in different countries, and such must ever be the tendency of free and unrestricted intercourse universally; but I certainly do not anticipate so perfect a result as that of entire absence of all variation in the exchange between different countries.

584. Unless the coins of the different countries, both the major and minor, were respectively permitted to be legal tender, there would be no certainty that you would obtain an invariable value for any exchanges that you had to make either in coin or bills; that would depend upon the balance of payments occurring at the moment between one country and the other?—It would no doubt always involve that consideration, but it would then come to be a clear unmixed simple per-centage on invoices, indicative of the actual exchange, and that only, and would not be mixed up with the inconvenience of different, above all of incommensurable coins and values, such as mils.

585. One of the objections which you have urged against the pound and mil system in your "Comparative Statement" is this, "that it wholly fails to afford the means of accurately computing sums so as to enable any one to balance his accounts correctly, not only with

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sums calculated by the present English coinage, but also by any foreign system of currency sums whatever"?—That is my opinion.

586. What do you mean by not being able to balance your accounts correctly with reference to any foreign system of currency?—I know no foreign system of currency which is exactly commensurable with the mil, that would measure exactly with it, and divide definitely without any remainder. If you have the penny and tenpence coincident with the franc and the ten-cent pieces and an exact five-franc dollar, the coins would all be entirely and perfectly commensurable, and foreign and English invoices and bills would exactly coincide and balance. But I know of no monetary system with which a mil currency would be exactly interchangeable; and the small fractional differences which could not be expressed, and must be lost on one side or other, (and almost always it is probable by John Bull,) in foreign transactions, will be found to add up to very serious amounts, even in some cases sweeping away all the profit, and they are of course wholly incompatible with any correct balance of books and accounts.

587. Interchangeable, that is, upon a very rough estimate, because the variable rate of exchange entirely prohibits such a thing as an invariable harmony between the two countries?—If the exchange is mixed up with incommensurable coins and monies of account, there is a difference beside the exchange, which the merchant cannot possibly express or obtain; but if these are not so, the cents which I propose would exactly indicate and measure with the most beautiful precision and clearness the exchange, and nothing else, and we should have done with rough estimates.

588. (*Chairman.*) I wish more clearly and completely to understand your system of blending the use of the pound sterling with the penny and tenpenny decimal system. Will you have the goodness to look at that table (*handing the same to the witness*),

£	*s.*	*d.*	£	x^d.	*d.*	x^t.	*d.*
27	11	7	27	13	9	661	9
16	9	11	16	11	9	395	9
30	19	3	30	23	1	743	1
15	9	8	15	11	6	371	6
6	5	2	6	6	2	150	2
96	15	7	96	18	7	2,322	7

which purports to represent sums, first of all, in pounds, and shillings, and pence on the present system; secondly, in the pound, tenpence, and penny system; and thirdly, in the tenpenny and penny system; does that correctly represent your view of the subject?—Yes, assuming the calculations to be correct, which, as regards my own, that is, the two latter forms of account, I can almost see at a glance that they are, and these two last I propose to render the only legal forms of account. Pounds, shillings, and pence would be no longer a legal form of rendering an account as regards the twelvepence or shilling; but I think it would best consult general convenience, and promote a sound safe change to a decimal system, if you might still legally render accounts in pounds, tenpences, and pence, or in tenpences and pence, optionally, thus leaving the pure decimal system to fight its own way on its own overwhelming merits.

589. Would your view be to authorize two different legal systems of account?—I should be in favour of giving the option. There is, however, some difference of opinion on this point amongst those who first and most cordially embraced and have most ably supported my scheme, some advocating abrupt and entire abandonment of the pound as a money of account, and others the substituting for it a third money of account of 100 pence; but not one, that I know, its abandonment as our gold coin and legal tender, or even that alteration of our present standard in weight and fineness, which seems almost involved in the mil scheme, and which has been actually proposed by two of its most active promoters. Either of these two modifications of my scheme could be subsequently adopted, if ever found expedient, without the slightest difficulty.

590. If the option be left, it will necessarily involve, as a consequence, the authorization of two legal systems of account, differing from each other?—Yes; so far as that the one form allows pounds, (24 tenpences,) as a third money of account, if it is preferred, and the other form is pence and tenpence only, with but two moneys of account, as in every other decimal system.

591. Looking at the middle column containing the representation of sums upon the system of the penny, tenpence, and pound scale, the addition, in that case, will involve the same difficulties which attend the addition under our present system, it will not be a simple addition according to the Arabic notation of numbers?—No; it will not, as regards one of the columns in this case, but the Arabic notation will be perfect in every other respect.

592. Will not therefore an account rendered in that form altogether lose the advantage of simplicity in calculation which is to arise from making an addition of the successive monies of account correspond to the Arabic system of addition?—It certainly would in this case lose it in the addition of one column of sums exceeding a pound in amount, but in all the multitude of sums up to the pound you would under all circumstances ever have in perfect operation the pure decimal system, and further the ready command of a pure and perfect decimal system for all calculations whatever. You certainly must work your calculations by applying the multiple of 24 to the pounds, in sums above a pound, stated

in the middle form, but I apprehend that the great convenience and advantage of the last form would soon lead people gradually and imperceptibly into its general use in all cases, and that we should thus avoid the difficulties of a too abrupt and compulsory violent change in our books, forms of account, and established habits.

593. You think that the result of adopting an intermediate system as set forth in that account would be the gradual abandonment of the pound and the adoption of the pure penny and tenpenny system?—Yes; excepting for the expression of large amounts.

594. You think therefore that for the expression of large amounts the pound sterling would still be used in account?—To some extent I think it would, but that the convenience of the other system would soon lead to the pound being generally banished from accounts; but being the gold money and legal tender of the country I think that it would be cu rently used in conversation, and would still retain some footing even in our accounts.

595. Do you not think that the maintenance of two systems of stating accounts, whether verbally or in writing, must necessarily lead to confusion and to inaccuracy?—In writing it will no doubt be a convenience when the one form is generally established, and introduced into our all books and bills, &c., but I do not see how the other can possibly lead to confusion or inaccuracy, and verbally I think the pound would ever be a positive convenience. I think that in foreign countries you find the want of not having a well-established uniform large money like the pound, by which at pleasure to express large amounts.

596. Does not that answer very clearly indicate the force and value of those considerations which have led many persons to say that the pound sterling cannot be abandoned as the highest integer of account?—They have led me to the conclusion that it is not well to abandon it entirely, and certainly not abruptly and forcibly.

597. Do you not think that a partial abandonment of the pound sterling must necessarily be a new and a very serious source of inconvenience, and of ambiguity?—I really have thought very much upon that subject, and I do not come at all to that conclusion, but directly the reverse. I think that there would be such convenience and vast advantage in a pure decimal system, that its general use would come about of itself and without resistance.

598. What do you conceive would come about of itself without resistance?—The quite general use of the penny and tenpence as the ordinary monies and form of account.

599. If the pound, the tenpence, and the penny be generally retained in use as monies of account, do you not perceive, by virtue of the very table now before you, that the simplicity of calculation will be lost, inasmuch as a strict adherence to the Arabic notation cannot be maintained?—Yes; and therefore I do not consider that there is the least risk or chance of the middle form in the table before me (pounds, tenpences, and pence) being at all generally retained.

600. I thought you stated in your previous answer the opposite conviction, that the pound would be generally retained?—No, certainly not. I understood the question to be whether I thought it desirable to abandon the pound altogether. I think it undesirable to abandon the pound altogether, but I confidently believe that it would be generally and voluntarily abandoned in all ordinary forms of account, and without any compulsory legislation.

601. I understand the general result of your evidence to be this—that it is your conviction that the introduction of the decimal principle into the monetary system of this country is desirable, provided it be introduced in the form which you have stated, of the penny, tenpenny, and pound system, but that the introduction of it in the form recommended by the Parliamentary Committee would involve more inconvenience and evil than the remaining as we now are?—Precisely; that is the substance of what I have to state.

602. Have you anything further to submit to the consideration of the Commission upon this subject?—The grounds on which I think that the legal substitution of the 10*d.* for the 12*d.* in our accounts would be one of the greatest benefits that could be conferred on this country, and would lead to the introduction of a complete and universal decimal system, and the formidable and insurmountable objections which appear to me to exist to any system founded on the mil, have now been long and very fully before the public, and the substance is given in the statement I have submitted to the Commission; and my views will I believe be fully sustained and explained in detail, as regards this country, by mercantile and other evidence of far higher authority and weight than mine; and I only wish therefore further earnestly to solicit the attention of the Commissioners to the foreign view of this question; to the fact that the French monetary system extending widely and steadily in Europe, adding whole nations, of their own free and voluntary act, to its territory, and even nations who will not abandon their own old monies, but obtain its important benefits by the simple course of rendering such monies coincident, (so that florins and guldens will probably soon be the same thing as 2 and $2\frac{1}{2}$ franc pieces, and the dollar a 5 franc piece); ere long the franc, or tenpence, must become the universal ruling integer and golden key with all accounts and monies whatever, and a fatal blow will be given to the commercial greatness and social position of this country if we should ever entirely abandon this universal decimal key for an incommensurable mil coinage and millesimal form of account.

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603. Do you consider that any great convenience now arises from the fact of the United States having the dollar and cent for their monies of account, and France having the franc and centime for their monies of account?—Not at present; but that very great would from having the identity of the coins perfect, would appear from what the Americans seem prepared and anxious to do in order to accomplish this.

604. You do not think that those two countries approximate sufficiently nearly to a uniform system to obtain any of the advantages which may arise from a uniform system?—No; you want identity, not mere approximation, to secure the advantages of uniformity.

605. You think that absolute identity is requisite to secure the benefits of uniformity of a monetary system?—Yes; absolute identity, or exact correspondence with reference to a common ruling integer, such as the franc.

606. Do you think that absolute identity can be obtained and preserved with regard to the value of the coin, both with reference to its standard fineness and to its weight, by the various countries of the world?—Yes. I am strongly of opinion that that would be the certain and well-secured result of what I propose. I do not mean to say that the coins, &c., must always and in all countries be precisely the same coins. The French franc consisting of 69·4 grains of pure silver, and a fifth of the American dollar being 69·11, the dollar will it seems be made in future five times 69·4 grains, and will be an exact five-franc coin, both as money of account and circulation. That would, and that alone will, completely answer the purpose of identity and internationality.

607. You mean by identity a distinct and settled proportionate value not to be deviated from?—Yes, and the convenience of which I think would prevent its being ever deviated from.

608. You think it reasonable to calculate and found measures upon the calculation that such exact proportionate value can and will be preserved by the different nations of the world?—I think that we may calculate upon it with confidence, and that any partial desertion by any little state or nation would only more firmly than ever attach all others, by the demonstration of its disastrous effects. But I beg to be understood as not resting my scheme on this ground alone. The even stronger case I think I have clearly shown, is that founded upon our own domestic monetary system and arrangements, and it rests on ground entirely independant of the acts and proceedings of all other countries.

609. (*Mr. Hubbard.*) What is the date of that paper of Mr. Mann's to which you referred as expressing the intention of the American Government to alter their silver currency?—I think it was published last year, but not going so far as to say that it was yet the intention of the American Government to make the desired change. The work is written in excellent French, and the authorities cited, and I have quoted the exact words in the statement I have submitted to the Commission.

610. You are aware that in our Australian colonies the standard of value is precisely similar to our own—it is in fact the sovereign?—Yes.

611. And notwithstanding the entire identity of the measure of value the exchange is hardly ever at par?—Yes.

612. And the balance in the payments from one country to the other is so variable an event that it almost always imposes some slight premium or discount upon the negotiation of bills of exchange?—Yes; I am quite aware of that fact too, and I do not apprehend that it can ever be altogether otherwise; but that would not make it the less a disadvantage and inconvenience that England and Australia should keep their accounts and coinage in different, above all in incommensurable, monies, incapable of closely and exactly balancing and meeting the values exchanged, nor the less a convenience and advantage that this variation of the exchange should ever be a distinct, clearly defined, unmixed per-centage on the invoices.

The witness withdrew.

Adjourned.

Wednesday, 11th June 1856.

The Right Hon. the Lord OVERSTONE in the chair.

J. H. Turner, Esq.

11th June 1856.

JAMES HOVELL TURNER, Esq. examined.

613. (*Chairman.*) You are at the head of the post-office at Cambridge, are you not?—Yes.

614. Have you turned your attention to the subject of decimal coinage?—Yes; I first had my attention drawn to it when I was in the Excise department. Most of the Excise calculations are made by decimals.

615. Have you formed any definite opinion as to the expediency or otherwise of practically introducing the decimal system into the coinage of this kingdom?—I think it would be very unpopular if there be the smallest hitch in the carrying of it out; otherwise, I think it might be done.

616. Do you think it is desirable that the decimal principle should be substituted for our present principle of subdivision of the integer of account?—I think so.

617. On what ground do you think that it is desirable?—Because it would facilitate calculations.

618. You think that the decimal principle of coinage would greatly facilitate calculations?—Yes.

619. Do you think that it would be desirable in any other respect than giving facility to calculations; would it also promote their accuracy;—I should say so, decidedly. For instance, I began life in a counting-house where the invoices were very long; there would be, for instance, 328½ yards of cloth at 4⅜*d.* If we had had decimals the items would have been much easier to calculate, and more likely to be correct.

620. Does your view of the advantage of the decimal principle apply equally to the application of it to the subdivision of material things as it does to calculations of abstract numbers in articles of merchandise, in retailing and marketing?—That is a doubtful case; at present I could only recommend decimals for the larger measures of weight.

621. You are of course aware that the cases now alluded to of retail transactions in the material commodities constitute a very large and important portion of the transactions of the country, especially of transactions in which the convenience and interests of the lower classes, and therefore the more ignorant classes, are concerned. Bearing these considerations in mind, do you think that the application of the decimal principle to transactions of that nature would increase the convenience of the community at large?—Yes; if it is a good system of decimals.

622. Do you think that the decimal principle of subdivision as applied to coins, and afterwards applied to the subdivision of material things, for which coins are the instruments of payment, would be more convenient than the present duodecimal division of them?—The coins would; I do not think that measures would; you would not get people to ask for $\frac{3}{10}$ths of a pint of ale.

623. If the decimal principle, in your judgment, could never be applied to the subdivision of commodities, do you think that it ought to be applied to the subdivision of coins, the instruments through which those subdivisions of commodities are to be paid for?—Yes.

624. Then do you think that decimally divided coins would harmonize with the non-decimally divided commodities?—I do not think that they would interfere at all.

625. If commodities are divided into halves, and quarters, and eighths, and sixteenths, and under a decimal division of coinage, the integer cannot be so divided; how do you think that there would be harmony of principle between things to be paid for and the instruments of effecting that payment?—I consider decimal coins and decimal measures to be quite distinct things. But in some respects, I must say, the present coinage has an advantage over a decimal coinage, because the present coins can be quartered.

626. Do you not think that that advantage, as applicable to the transactions of the lower classes of society, is a very important advantage, and one which would be felt in the daily and hourly transactions of every retail market in the kingdom?—No, I think not; it has not occurred to me so; it is only a simple calculation of one article; half-a-quartern of potatoes at 10*d.* a quartern is easily calculated.

627. Take the case of any article, say sugar, or any other article now sold at 1*s.* a pound, can you trace the mode of paying for that pound in all its subdivisions—of the half-pound, the quarter of a pound, the eighth of a pound, and the ounce, with the same facility when the shilling is divided into ten parts as you now pay for it when the shilling is divided into twelve parts?—I should say not; that is an advantage which the present coinage possesses over a decimal coinage.

628. What is your opinion of the proposed system of decimal coinage recommended by the Parliamentary Committee?—I am decidedly adverse to it; I was adverse to it in Sir Charles Wood's chancellorship; that was the first time that I opposed it; I saw that it would injure the Post Office revenue; I calculated the loss at 60,000*l.* or 70,000*l.* per annum, but it appears that I underrated it.

629. Do you perceive any other objections to that scheme, except the one which you have stated, namely, its necessarily making some alteration in the Post Office revenue?—Yes.

630. What are the objections which you entertain to that scheme?—Of course all decimal plans will give trouble. I think that trouble ought to be kept out of consideration as an objection to any scheme; but I have an additional objection to the Parliamentary scheme, as regards trouble, inasmuch as the decimal system is asked for by the educated and mercantile classes, and is not asked for by uneducated persons. The Parliamentary plan throws all the trouble on the parties who do not ask for it, and who would rather not have it; they do not want any alteration, and it is for us to get over those scruples rather than to increase them. On the other hand, those plans which are based on the penny give no trouble to the lower classes, but throw all the trouble of the change upon those who ask for it, and who are most able by education to cope with the alteration.

631. Is it your opinion that the lower classes of society do not in any respect desire a decimal coinage?—I decidedly think that they do not; I do not think they understand it.

632. Do you think that it is from ignorance, or that it is from a settled opinion that it would not promote their convenience?—From ignorance and the inertness of people's minds, which

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dislikes any arithmetical innovation. This state of feeling exists to a considerable extent amongst educated persons in the middle class as well as amongst the lower classes.

633. Is there any other plan of decimal coinage which you think superior in its recommendations to that sanctioned by the Parliamentary Committee?—I have proposed a plan of my own in a pamphlet.

634. Will you have the goodness to state your view upon that subject?—I have other objections to the Parliamentary scheme.

635. Will you have the goodness to state seriatim the objections which you entertain to the Parliamentary scheme?—First, I will refer to its injurious effect upon some retail trades: for instance, a publican who now sells his beer at a penny the half pint (this is well known to be an unalterable price), will have to sell 25 half pints for the same money that he now sells 24 for, consequently he must lose 4 per cent upon his gross returns; as it is also well known to those who understand the beer trade, that all the publican's loss falls on the brewer, the brewer loses 4 per cent of his gross returns.

636. You think that the introduction of the decimal coinage in the form proposed, would inevitably entail upon the wholesale dealer, of which a brewer may be taken as an example, a permanent loss for which he could not be compensated?—I do think so.

637. Have you any other objection to state to the Parliamentary scheme?—There is a tobacconist in Cambridge, upon whom Lord Monteagle called, who is in the same position as the brewers. He is well known to be a man of sense and moderation. He says that he sells the greater part of his tobacco in half ounces over the counter. It is a superior article that he sells at $1\frac{1}{2}d.$ the half ounce: he says that he should lose 4 per cent of his gross returns for that article, because he could not obtain more than 6 mils. for half an ounce, and he could not think of selling an inferior article. He attributes his extensive trade to the goodness of the article.

638. Does not that very case which you have now stated, namely the tobacco sold at $1\frac{1}{2}d.$ the half ounce, show the greater convenience of the divisibility of the integer of account when divided by 12 than when divided by 10. $1\frac{1}{2}d.$ the half ounce will give $3d.$ the ounce, which will give $3s.$ the pound if you take 12 ounces to the pound, or $4s.$ a pound if you take 16 ounces to the pound; does that subdivisibility of $3s.$ or $4s.$ per pound down to $1\frac{1}{2}d.$ the half ounce show the superior convenience and subdivisibility of the integer, be it $1s.$ or any other integer?—I think it does, but the Commissioners will see that I am now speaking of the loss that would accrue to the retailer by the Parliamentary scheme. He would lose 4 per cent on his gross returns.

639. Your view of the question is, that if in the case stated the decimal division of the coin be substituted for the duodecimal, two evils would arise, namely, general inconvenience from the less perfect divisibility of the integer, and absolute loss to the tradesman in his retail transactions?—Absolute loss to some tradesmen.

640. Is there any other objection to the Parliamentary system which you wish to lay before the Commissioners?—I do not mention any of the objections that were dealt with by the Parliamentary Committee.

641. Will you state any objections which you think are valid objections?—I wish to call your attention to the benefit societies. The Manchester Unity, which is the largest, has 4,000 lodges, and 230,000 members. I find that most of the lodges pay every fortnight; the subscription rising from $4d.$ a week to $7d.$ a week. If the cent and mil plan were carried into operation, the old members will have paid in in the large pence, and they will have to receive out in the small pence.

642. Do you consider that that discrepancy of value cannot be adjusted by any arrangement which might be applied to the case?—I have not seen their books, so that I cannot speak positively; I know that some of the members apprehend confusion.

643. Can you mention the name of any manager or accountant to any of those lodges or societies, who could best instruct this Commission on the subject of these difficulties?—At home I have the name of such a person. He lives at Manchester; I have written to him on the subject. He informs me that the subject will be brought before the general meeting of the Manchester Unity in August. There are other societies of the same kind.

644. What is the scheme of decimal coinage, the adoption of which you would recommend?—I will begin with observing, that all the other schemes launch into a decimal system, but they do not provide for the completion of it. I consider this to be a most important point.

645. Will you have the goodness to state what system you think desirable, as meeting that difficulty?—I should transfer the names of shillings and pounds to coins of $10d.$ and $100d.$, which are ultimately to be called shillings and pounds of the new currency.

646. What would you take as the basis?—A penny.

647. What would be your system of money account in that case?—Pounds new currency, shillings new currency, and pence.

648. Your decimal system then would be a penny, the tenth multiple of a penny, and the one hundredth multiple of a penny?—Yes; there will be, consequently, an equivalent value in either currency, and nobody will be injured.

649. What is your opinion with regard to the objections that have been urged to abandoning the pound sterling, as the highest integer of accounts in our system?—I think the objections are made too much of.

650. Do you not think that great inconvenience would arise from disturbing that which has by immemorial and universal usage of this country become the great integer of account in all our transactions?—There is no doubt of it.

651. Do you think that the convenience of a decimal coinage, such as you would suggest, would overbalance the greater inconvenience likely to arise from an alteration in our present integer of account, the pound sterling?—I think that the difficulties might be obviated.

652. In what way would you suggest that the difficulties might be obviated?—According to my plan, as I said before, there is an equivalent value in both the currencies; such being the case, it would be easy to understand that 1*l.* in the old currency is equivalent to 2*l.* 4*s.* in the new currency.

653. According to your system, every sum of money, instead of being now stated in pounds, shillings, and pence, would be simply stated in the number of pence of which it consists?—Yes, that is one way of stating the plan.

654. For instance, one pound sterling would be represented by 240 pence?—Yes.

655. Do not you think, upon that very statement, that 240 would be a much less convenient symbol than 1*l.* to represent that sum?—We do not always have to do with even pounds.

656. Take 10*s.*, would not 120 be a less convenient symbol than 10 to represent that value?—Yes, but I should say that 6*s.* is as often used as 10*s.* in an account.

657. Take the case of 6*s.*, would not 72 be a less convenient symbol than 6/. to represent that value?—Yes, it would not be quite so convenient, but in other sums the new would be more convenient than the old.

658. Will you state the other sums in which it would be more convenient?—Instead of saying 1*s.* 8*d.*, I should say 2*s.*, and there I get the advantage.

659. Instead of 1*s.* 8*d.*, you would represent 20*d.*; do you think that you gain any great advantage in that?—I should gain as much in that and similar cases, as I should lose in the other cases.

660. Did you ever draw out a tabular statement showing the respective symbols by which every sum, from a penny up to a pound, would be represented under the two systems?—I began to do so once, but its very simplicity prevented me from finishing. It is a thing that can be done by anybody.

661. Can you state the number of figures involved in the one system and in the other?—My impression is that there are fewer figures in mine.

662. Are you satisfied that your system would involve greater convenience and facility than the existing system?—Yes, I think so, if it were once got into work—that is the great thing.

663. (*Mr. Hubbard.*) If I understand your plan it proposes to call a piece of 10*d.* a shilling new currency, and a piece of 8*s.* 4*d.* a pound new currency?—Yes.

664. And thereby to retain the brevity of expression which you now have, only applicable to a somewhat different value?—Yes.

665. (*Chairman.*) Looking not merely to the verbal expression, but to the mode of writing it in figures, are there not many cases in which your system would involve more figures than the present system?—I expect, if it were examined narrowly, that my system would involve fewer figures than the present one. I have incidentally given a case, in my pamphlet, in which I use three figures instead of five.

666. The main objection to your system, of course, would be the alteration of the pound sterling, or rather the abandonment of it, which it would necessarily involve, and the more cumbrous statement of large sums which, of course, must occur under your system. Have you any remarks to make with the view of obviating or diminishing those difficulties?—The future coinage of a 1,000*d.* piece, with a distinctive name, would be less cumbrous than the present system. This piece would be worth 4*l.* 3*s.* 4*d.* of the present currency. It need not be pushed into circulation, but used principally for accounts with large figures. The present pound need not be altogether abandoned, but would be used occasionally, I daresay, just as the guinea is, although the coin itself is not in circulation. As, however, I propose to appropriate the term pound to my system, the use of the pound, old currency, would be confined to few occasions.

667. (*Mr. Hubbard.*) You have mentioned two points as to which you apprehended difficulty in carrying out the pound and mil scheme—the difficulty in the sale of beer, and in the operations of friendly societies?—Yes; these are my chief points.

668. With regard to the sale of beer it is quite evident, as you stated, that, if a brewer or a publican is to sell the same amount of beer at $\frac{1}{25}$th less, he will be a considerable loser, and that loss may tell very materially upon the profits either of the retailer or the brewer?—Yes.

669. Has it not occurred to you that, as in other commodities (for instance, in the article of tea), the price is adjusted to a convenient sum by making up the quality to a standard which is convenient, so it might be in beer; and that, if the brewers are obliged to sell beer at $\frac{1}{25}$th less, they can meet that necessity by lowering its quality by $\frac{1}{25}$th?—I believe, if the Cambridge people were asked, they would say that the public-house beer cannot be worse than it is. The brewers of Cambridge apprehend a loss. I believe Lord Monteagle was told by the Mayor of Cambridge, who is a brewer, that he apprehended a serious loss.

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670. If the beer cannot be made worse than it is to the consumer, it is clear that if the brewer reduces its strength by $\frac{1}{25}$th part, and sells at a price $\frac{1}{25}$ less his profits will remain unaltered and the consumer can be no loser, according to your account of the quality?—It would hardly be beer at all if it was made weaker. The state of the case is this; when malt is dear, the brewer's profit is lessened; if it be urged that the brewer should raise his prices, I would answer that the price of bread can be easily raised, but the price of beer cannot. When malt became dearer there was an endeavour to raise the price, but it failed. The retail price of beer is the same now as when malt was much cheaper. It may be said, that when malt is lower the brewer can compensate himself. I reply, "What business have you to interfere in such an arbitrary manner with the brewer's profits?" You propose to deprive him of a prospective advantage which belongs to him by the natural course of trade, and with which he hopes to counterbalance the past. Besides, if we may look for a fall in malt, we may equally look for a subsequent rise. When present prices, after having departed for a season, came back again, the brewer would again feel the deficiency in his returns which is threatened by the small penny.

671. With regard to benefit societies, the advantage of a benefit society depends, does it not, upon the amount of subscriptions which a member has paid, and which entitle him to certain allowances in cases of illness?—Yes.

672. The interest which each member of the society has in it may I presume be made the subject of estimate; whatever interest he has in the benefit society can be made the subject of estimate, may it not?—I am not sufficiently acquainted with the details to give an answer to that question.

673. I think it is quite obvious that everything of that kind may be made the subject of estimate, therefore the difficulty which you speak of might be disposed of by repaying to the members one twenty-fifth part of the value of the interest which they have now under the present currency?—It might be so; I cannot say that I am sufficiently acquainted with the subject to give a decided opinion upon it; my impression is that confusion would be caused in their accounts by the incommensurability of the two systems. If 14*d.* were equal to 5 cents 6 mils they would understand it, but it is equal to 5 cents 8 mils and a fraction of a mil, and that I think will cause confusion.

674. That difficulty with regard to confusion would undoubtedly exist at the moment of transition from the one system of currency to the other; but after the account had been once transferred to its new expression, that is, when the statement of funds in pounds, shillings, and pence had been transferred into a statement of pounds, florins, cents, and mils, the consequent allowances from the fund would become payable in florins, cents, and mils, and the confusion would no longer exist?—It is impossible to say until it comes into operation. I cannot readily divest myself of the idea that confusion will be caused.

675. You are not prepared to say that those solutions of the difficulty could not be applied, but that they have not occurred to your mind as probable?—I am not. The Commissioners had better ask the Manchester Unity people. I doubt whether these societies will like any interference with their funds.

676. Has it not occurred to you that if the idea of a shilling now represents 12 pence, it would be an inconvenient thing under your plan to be calling a shilling that which was only tenpence?—No, I do not think so. They have done the same thing with the gallon; the imperial gallon was not always of the same size as it is now. I have another precedent for applying old names to new things. When the style was altered, the names of the months were not changed; the one is distinguished from the other by saying new style or old style, as the case may be, just as I propose to distinguish new currency from old currency. There is no confusion between May Day as it stands in the Almanack and old May Day, when the cattle are turned upon the common at Cambridge. We may expect the same facility in distinguishing a shilling new currency from a shilling old currency. The historian will refer in his margin to the relative value of money, as he now does to the apparent difference of date. The change of style was disliked at the time, as all such changes are; but if it was unpopular, it was at least successful. Hogarth's populace ask to have their days given back to them; if their successors should say, "Give us back our penny," let it not be found that it has actually been taken away from them.

677. You do not apprehend that any inconvenience would arise from applying the term pound to that which would be worth 8*s.* 4*d.* only, whereas it is now applied to that which is worth 20*s.*?—It would require a little management on the part of Government. I can state, if the Commissioners will allow me, how I should do it: I should circulate the 10*d.* and the 100*d.* coins; I should say nothing at first about pounds, shillings, and pence new currency, but I should ask the public to treat them as being worth so many pence; I should make out a table—it could easily be circulated by means of the post-office. If a person had a 100-penny piece and three 10-penny pieces, he would count the number of pence, 130 pence; he would then refer to the table and find that the coins were equal to 10*s.* 10*d.* If he had any of the old coins to add to them, say a 5-shilling piece, that would make 15*s.* 10*d.* When the new coins preponderated in the circulation, my pamphlet proposes that a day should be named by the Treasury, on which a shilling should be deemed to mean 10*d.*, and a pound to mean 100*d.*, unless anything showed that the old values were meant. The people in general wish to retain the old names of pounds, shillings, and pence. I take advantage of this to drive the old system out of use. It is easy enough to introduce a new system, but the difficulty is to get rid of the

old one. I am firmly persuaded that my plan would eradicate the present system. If you get cents and mils into operation (or even imperials, albions, and pence, according to Mr. Minasi's suggestion), still, in country places a great number of people will continue to calculate by pounds, shillings, and pence.

678. (*Chairman.*) In comparing the relative merits or defects of your system and the Parliamentary system you cannot fail to have been struck with one very pointed difference between the two systems. Under the Parliamentary system the present mode both of symbolizing and calculating the pound sterling and all its multiples remains unaltered, and a change would take place only in the fractional part of the pound sterling; while in your system there would be a change involved in both cases, not only the fractional parts of the pound sterling would be differently represented under your system from what they now are, but also the pound sterling in all its multiples would undergo a change both in the symbols representing them and in the mode of estimating them. I ask you your opinion as to the effect of the difference between the two schemes?—I am afraid that I do not sufficiently understand the purport of your Lordship's question to give an answer.

679. The question has reference to the relative tendency of the two schemes to produce convenience both in writing and in estimating sums. For instance, under your scheme one pound sterling would be represented by two imperials and four albions; now take the higher sum, say, for instance 1,900*l.* under your scheme that would be represented by 4,560 imperials; do you not think that a system of coinage which called upon you to represent 1,900 by 4,560 is more cumbrous, and therefore less convenient, and less calculated to facilitate both accuracy and expedition in account keeping than the present system?—It would not be quite so convenient. In order that other parts of my evidence may not be misunderstood, I beg to remark, that the terms "imperials" and "albions" are terms which belong to Mr. Minasi's plan. By an albion Mr. Minasi means 10*d.*, and by an imperial he means 100*d.* Up to this point our plans are the same.

680. Is not the greater convenience the entire object of any change in the present system of our monetary subdivision?—Yes.

681. Therefore, if your system shows itself in two important respects less convenient than the present one, is not that a very formidable objection to it?—If that is the case, no doubt it is; but if we had the 1,000*d.* piece which I have spoken of, I should represent the same sum with three figures instead of four; the figures would be 456 instead of 4,560; 456 is less cumbrous than 1,900.

682. But the 1,000*d.* piece would not be a money of account; large sums must necessarily be stated in account keeping in a number of monies of account, and as your highest money of account will be much lower than the pound sterling, so much so, that the one pound sterling will be represented by two imperials and four albions, must it not necessarily follow that all the multiples of the pound sterling will be represented by symbols less convenient than the existing symbols?—Yes, it does; we get an increase of figures in the pounds, but we have a decrease in the right-hand figures.

683. That is the very point to which I wish to draw your attention in your system, that whilst you get increased convenience in representing fractional parts of the pound sterling, you necessarily involve increased inconvenience in representing the pound sterling in its multiples?—Yes.

684. Balancing those two one against the other, do you think that the convenience in the one case is sufficient to justify the inconvenience as regards the number of figures that would attend the abandonment of our present system?—Yes, because the masses of the people have to do with shillings and pence, while there are comparatively few persons who have to do with the pounds.

685. Do you think it can justly be said, that few persons have to do with accounts in which the pound sterling or its multiples are involved?—Comparatively few people have to do with accounts which have many figures in the column for pounds.

686. Do you think that few persons have to do with accounts in which the pound sterling or some of its multiples are involved?—Few persons have to do with such large sums as 1,900*l.*, which your Lordship mentioned. There are very few people in the country who have accounts with four figures in the pounds. With reference to your Lordship's observation that the 1,000*d.* piece would not be a coin of account, I wish to observe that if eventually it should be deemed advisable to have such a coin, there is nothing to prevent people using it as a coin of account if they please.

687. Do you think that the desirability of introducing the decimal principle into our coinage depends upon the adoption of it in the form you recommend with the penny basis; or if the adoption of it in the form you recommend be deemed impracticable, do you think it is desirable to introduce the decimal principle upon the grounds recommended in the report of the Parliamentary Committee?—I do not think so. I think that cents and mils would be very unpopular.

688. (*Mr. Hubbard.*) You think it better not to attempt the introduction of a decimal principle into our coinage, rather than to make the attempt in the form recommended by the Parliamentary Committee?—I do so decidedly. I have come quite to that conclusion.

689. (*Chairman.*) Is there any further observation or suggestion upon this subject that you wish to lay before the Commissioners?—I am not aware of anything else.

Adjourned.

Mr. F. J. Minasi.

18th June 1856.

Wednesday, 18*th June* 1856.

The Right Hon. the LORD OVERSTONE in the Chair.

Mr. Frederic James Minasi examined.

690. (*Chairman.*) You are an instructor in mathematics and in the physical sciences, are you not?—Yes.

691. You have turned your attention, have you not, to the subject of decimal coinage?—I have.

692. Is it your opinion that it is expedient and practicable to introduce the principle of decimal coinage into this kingdom?—I entirely acquiesce in its expediency; but I have some doubts about the practicability.

693. Will you have the goodness to state the nature of those doubts?—They have chiefly reference to the opposition which I fear would arise from the lower ranks of the people; from those who by long habit have become so accustomed to our present system of money and accounts, that they would be unwilling to relinquish it for another, the advantages of which they do not see, or encounter the trouble necessarily consequent upon a change, however small it might be. I think I am not in error in asserting that a large majority of the middle classes, including shopkeepers and retail dealers, would be opposed to it.

694. On what ground do you apprehend that the middle classes, the shopkeepers and retail dealers, would object to it?—From reasons akin to those I have just given. From habits of education and practice the middle classes are accustomed, in all mercantile and traffic transactions, to think of values in relations to pounds, shillings, and pence, as at present constituted; with such an arrangement they seem quite contented, and appear to have no desire to undergo any inconvenience attending a change for which they have not discovered the necessity. As a question of facility in accountancy, there appears to be much difference of opinion even among those interested in the question; and if all the clerks and bookkeepers throughout the kingdom were to be canvassed on this question, I should not be surprised to find that the majority would be found to declare in favour of leaving matters as they are. Those who are passing from the turmoil of business being prejudiced against what they would term new-fangled notions, and new comers being unwilling to lay aside what had just cost them so much labour to acquire. With regard to shopkeepers as a class, I feel confident this feeling would be found very generally to prevail; they would be unwilling to invite that which would involve alterations in their prices and books, and in all those simple methods of computation by which they can so easily and rapidly arrive at the value of their goods in retail transactions.

695. Do you think that shopkeepers would find any serious inconvenience in the application of the decimal coinage to the division of their material commodities?—That would depend upon the particular system of decimal coinage that might be adopted; and must be discussed in connexion with the various plans offered for bringing about the change. It would depend likewise upon the consideration whether the decimal principle is to be applied to our weights and measures also. I am now stating what I believe is the feeling, or rather want of feeling, on the part of tradesmen and others on the question of any change in the money of the country. I am much discouraged in my advocacy of an alteration by the small amount of interest that is taken in the subject, even by those who would be most affected by it, and by the unwillingness to encounter a change on the part of the few who do at all consent to examine the arguments of those who desire to see the reform carried out. I have received letters from tradesmen whom I have induced to express an opinion on the question, who state their wish to be that no change in the coinage of the country should be attempted. I may mention in particular a letter to this effect from the head of a bookselling firm in Paternoster-row; and one I yesterday received from a grocer and tea-dealer doing an extensive business in Islington, in which the writer expresses the hope that no change may be made in our present money and system of accounts, which he says he has used for 40 years without any difficulty, and which he considers to be well adapted to the purposes of commerce. This is an example of the few tradesmen who take the trouble of at all thinking on the question, the majority being both ignorant and indifferent about it. Wishing to ascertain the opinions of the shopkeepers of my vicinity, I invited, by circular, about 160 of them last evening to a meeting at my house, stating that I had been summoned by Her Majesty's Commissioners to give evidence before them on the subject of the proposal to alter our money and mode of keeping accounts; and that on so important a matter I was anxious to hear their opinions. Only six persons availed themselves of the opportunity thus offered, and these, who with but a single exception had previously talked the case over with me, whilst generally acquiescing in the facilities of a decimal mode of computation, expressed no decided opinion in its favour; or of any plan by which to effect the change.

696. Do you think that the difficulties and objections to which you have alluded are principally founded upon the inconvenience of a change from the one system to the other, or are they in any degree founded upon the apprehension that a decimal system, when adopted, would not be so convenient as the existing one?—I should say that the difficul-

ties and objections I allude to are founded on anticipated inconveniences of a change from one system of money and accounts to another. There is an indisposition to entertain the question in any shape, from an impression that it is not called for. As to decimals there is a great amount of ignorance, and I believe arithmetic is altogether imperfectly taught in the middle-class schools of this country.

697. Your impression, from your intercourse with shopkeepers, which I presume from your former statement has been extensive, on this subject, is, that there does not exist amongst the tradesmen, especially the retail tradesmen, any feeling of the necessity of adopting a decimal system of coinage in lieu of the present system?—Exactly so; that is my impression. There appears to be very little interest in the question among them.

698. Do you think that the tradesmen with whom you have communicated on this subject, have any sense of serious and practical inconvenience from the difficulties arising from the present compound arithmetic that is involved in our duodecimal system of coinage? —I think that the difficulties of our weights and measures are more apparent to them than are those of the money arithmetic.

699. By the difficulties of weights and measures to which you allude, do you mean the inharmonious and inconsistent system of our different weights and measures, or the fact that we have not a decimal system of weights and measures?—The former.

700. Therefore that feeling of objection to our present system of weights and measures had no reference whatever to a decimal system of coinage or a decimal system of weights and measures, but simply to our confused and inconsistent system of weights and measures?—Yes, precisely so. With regard to the advantages to be derived from a decimal system of coinage, I have already observed that I do not think the question has been considered by the majority of people. I have heard of a wine merchant, in a very large business, who called upon his neighbour to know what the question of a decimal coinage meant.

701. Do you think that the question of the advisability of a decimal system of coinage is in any degree dependent upon the question of a decimal system of weights and measures? —I am of opinion that they are most intimately connected. I think if the question concerned the decimalization of our coinage only, it would scarcely be worth while to entertain the subject.

702. You think that it would not be advisable to introduce the decimal system into the coinage of the kingdom, unless it was upon the understanding that it would be completed or followed by a decimal system of weights and measures?—That is my decided opinion.

703. Taking a general view of the considerations to which you have already alluded, is it in your opinion a desirable thing that the attempt should now be made to introduce a decimal system of coinage into this country?—Depending upon the way in which it might be attempted, I think it is both possible and desirable to attempt the change in question.

704. Upon what ground do you think that it is desirable. Is it your opinion, under the existing circumstances of this country, taking into consideration the various reasons which you have already alluded to, that it is desirable that the attempt should be made to introduce a decimal system of coinage into this country, in place of the existing one?— That is my opinion. Taking into account the difficulties and objections alluded to, and which I believe to exist, I nevertheless think that, under the exercise of proper caution, and by the selection of a sufficiently popular plan, the attempt might be made; always, however, with the understanding that the change would extend to our weights and measures.

705. Assuming then that the present system of weights and measures is to remain unaltered, you are of opinion that the decimal system of coinage would not be advisable?— I should say that it would not be advisable.

706. In what respects do you think that the decimal system of coinage is superior to the present system of coinage?—The superiorityof a system of coinage based upon the universally adopted notational law, over every other form, as a means of facilitating money computations, seems to be acknowledged by nearly every one who has considered the question. Whilst cordially acquiescing in this superiority, I by no means adopt some highly-coloured statements on this part of the subject which have been put forth by enthusiastic theorists who, in their eagerness to recommend their schemes, would reduce all arithmetic to the first four rules. I am of opinion that the pre-eminence of a decimal system of monies, weights, and measures consists in reducing the number of arithmetical rules required under a mixed system, and introducing a greater simplicity and similarity in those employed; in presenting both to the learner and the professed computer fewer liabilities to error, less entanglement, and in the majority of cases requiring a less amount of figures in a given operation than at present is needed under our compound system. I think there can be little doubt on this head; consequently there would be a saving of time, not only in the instruction of the youth, but also in the labours of the skilled practitioner. This part of

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the subject has frequently, though not always with fairness, been illustrated by examples taken from various processes in arithmetic. I exhibit the following:—

A CALCULATION made by Methods in ordinary use, to determine the value of 3 cwt. 1 qr. 23 lbs., at 1,238*l.* 3*s.* 8*d.* per cwt.

By Proportion.

cwt.		£	s.	d.		cwt.	qr.	lbs.
1	:	1238	3	8	::	3	1	23
		20				4		
		24763				13		
		12				28		
		297164				127		
		387				26		
		2080148				387		
		2377312						
		891492						
		115002468						

112) 115002468 (1026807
112
300
224
762
672
904
896
868
784
84
112 = $\frac{3}{4}$*d.*

12) 1026807
2,0) 8556,7–3*d.*
4278–7*s.*

Ans. 4278*l.* 7*s.* 3$\frac{3}{4}$*d.*

By Practice.

qr.		£	s.	d.
1	$\frac{1}{4}$	1238	3	8
				3
lbs.		3714	11	0
14	$\frac{1}{2}$	309	10	11
[7	$\frac{1}{2}$	154	15	5$\frac{1}{2}$
[2	$\frac{1}{7}$	77	7	8$\frac{3}{4}$
		22	2	2$\frac{1}{2}$
		£4278	7	3$\frac{3}{4}$

On a system of decimal money and weights, the former being based upon a penny and the latter on a pound, so that, retaining old names, 10 pence = 1 shilling, 10 shillings = 1 pound sterling, and 10 pounds = 1 quarter, 10 quarters = 1 cwt., the same question would be the determination of 3 cwt. 8 qrs. 7 lbs., at 2653*l.* 2*s.* 5*d.* per cwt., and would be worked as follows, the proportion being,—

cwt.		£	s.	d.		cwt.	qrs.	lbs.
1	:	2653	2	5	::	3	8	7

and the result obtained by multiplication,—

265325
3·87
1857275
2122600
795975
1026807·75 = 10268*l.* 0*s.* 7·75*d.*

In all my remarks on this head, I wish distinctly to be understood as including the idea of a reform in the weights and measures as well as in the coinage, so that the advantages to be derived from decimals may have full efficacy.

707. I think that the Commissioners clearly understand your opinion to be, that unless a decimal system of weights and measures either is accompanied by or is immediately associated with a decimal coinage, decimal coinage taken alone would not be an increase of convenience, or be attended with any other recommendation?—I think not;—that is my opinion. There might, it is true, be some increase of facility in arithmetical operations involving money only; but these advantages would, I fear, be counterbalanced by inconveniences arising from the greater dissimilarity that would then be found to exist between the money under the new form, and the old weights and measures, than at present, when, notwithstanding the want of it, close relations often obtain and are advantageously employed in mental calculations; such, for instance, as that of the foot of 12 inches and the shilling of 12 pence, or of the ton divided into hundredweights, and the pound sterling of 20 shillings. It is upon these considerations that I doubt the expediency of attempting a reform in the coinage irrespective of the question of the weights and measures.

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708. Supposing it to be introduced accompanied by a system of decimal weights and measures, your opinion is that the principal advantage of the decimal coinage would be in facilitating calculations?—Yes.

709. Have you considered its effects in its other great department, namely, facilitating the retail transactions of the market, and its connection with the purchasing and adjusting the payment for commodities subdivided in retail?—I have not considered that so fully as I have the previous matter. So far as I have been able to see, I do not think that there would be quite the amount of advantage in this case as in the previous instance.

710. Have you considered the effect of the decimal system of coinage upon the mental transactions of the lower classes, those calculations which they have to make in their head in the confusion of a market?—I have.

711. Do you think that the various fractions of a pound sterling stated in decimal notation would be as easily carried in the head, and all the calculations depending upon them as easily performed in the head, as they are now under the shillings and pence system?—I think not.

712. Do you not think that that is an important consideration?—No doubt that is a very important consideration. I must, however, be permitted to observe that I by no means agree with those who appear desirous of reducing all operations under the proposed change to a purely decimal character; there is no reason why fractional parts should not be employed then as now in obtaining results by mental calculation; it is more difficult to remember ·08333+ than $\frac{1}{12}$, but then there is hardly the necessity for this, as it clearly is an easier process to divide mentally by 12 than to multiply by the decimal form of its reciprocal, and doubtless such would be the course pursued; but if calculations involving subdivisions so common in all retail transactions are to be conducted on the principle of pure decimal fractions, then I am free to confess that such results are more easily obtainable upon our present system.

713. In mental calculations?—Yes; there are various short rules by which results may very easily be obtained under our present mixed system of money, weights, and measures, which under the decimal system would be entirely abolished, and I think it is doubtful to what extent their places would be supplied by others presenting equal facilities.

714. Have you formed any decided opinion respecting the various systems of decimal coinage which have been suggested?—I have, I believe, examined all the different systems that have been placed before the public up to the present time.

715. What is your opinion of the system recommended by the parliamentary committee which proposes to divide the pound sterling into 1,000 parts?—I am entirely opposed to that system.

716. Upon what grounds does your opposition rest?—I will briefly state to the Commission what appear to me to be the main grounds of objection to the plan in question. In the first place, a very important argument against the proposal for effecting the decimalization of the coinage by the subdivision of the pound into 1,000 mils, is derived from the necessity of creating several novel coins which would be uninterchangeable with many now in most popular use. I refer to the *cents* or hundredths, and *mils* or thousandths of the pound sterling, and their multiples, which would be incommensurable with the whole of the copper money at present in circulation, including the threepenny and fourpenny pieces. In this table I have furnished the values in the proposed coinage of any number of pence to 12, in which it will be seen that of twelve sums commencing at a penny, but two could be accurately represented. The values of present fractions of a penny are also given:—

Pence.	Cents.	Mils.	Pence.	Cents.	Mils.
1 =		$4\frac{1}{6}$	7 =	2	$9\frac{1}{6}$
2 „		$8\frac{1}{3}$	8 „	3	$3\frac{1}{3}$
3 „	1	$2\frac{1}{2}$	9 „	3	$7\frac{1}{2}$
4 „	1	$6\frac{2}{3}$	10 „	4	$1\frac{2}{3}$
5 „	2	$0\frac{5}{6}$	11 „	4	$5\frac{5}{6}$
6 „	2	5	12 or 1 shilling „	5	0

$\frac{1}{4}$d. = $1\frac{1}{4}$ mils; $\frac{1}{2}$d. = $2\frac{1}{12}$ mils; $\frac{3}{4}$d. = $2\frac{1}{8}$ mils.

The same discrepancy would obtain in all sums composed of shillings, or of pounds and shillings, with the pence here given, and it is worthy of notice that of 960 sums commencing at and advancing equally by a farthing up to £1, not more than 40 could be accurately represented in the new money. In fact no sum of present money, unless it contain an exact number of sixpences, could be correctly paid in the new money, which in like manner could not be represented without fractions, in the former currency, as shown in this table:—

Mils.	Farthings.	Cents.	Pence.
1 =	$\frac{2}{2}\frac{4}{5}$	1 =	$2\frac{2}{5}$
2 „	$1\frac{2}{2}\frac{3}{5}$	2 „	$4\frac{4}{5}$
3 „	$2\frac{2}{2}\frac{2}{5}$	3 „	$7\frac{1}{5}$
4 „	$3\frac{2}{2}\frac{1}{5}$	4 „	$9\frac{3}{5}$
5 „	$4\frac{4}{5}$	5 „	12
6 „	$5\frac{2}{2}\frac{0}{5}$	6 „	$14\frac{2}{5}$
7 „	$6\frac{1}{2}\frac{3}{5}$	7 „	$16\frac{4}{5}$
8 „	$7\frac{1}{2}\frac{7}{5}$	8 „	$19\frac{1}{5}$
9 „	$8\frac{1}{2}\frac{6}{5}$	9 „	$21\frac{3}{5}$
10 or 1 cent. „	$9\frac{2}{5}$ = $2\frac{2}{5}$d.	10 or 1 florin „	24

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From this consideration arises a further objection to the proposal now under consideration, namely, the necessity on its adoption for either withdrawing the copper coins in circulation, inclusive of the threepenny and fourpenny pieces, or the depreciation of their present value. There are now, I believe, between 5,000 and 6,000 tons of copper money in use, and a large amount is, I understand, in course of addition. In the year 1854 there were coined 270 tons of metal, forming 6,800,000 penny pieces, 12,400,000 halfpenny pieces, and 6,500,000 farthings; and a few months back petitions were presented to the government by manufacturers in Lancashire for an increased supply of threepenny and fourpenny silver pieces, which were stated to be found most convenient in the payment of wages. In the event of the withdrawal of the old copper, that change would have to be effected simultaneously with the substitution of the new, inasmuch as the co-existence of two incommensurable moneys would be irksome in the extreme and lead to great confusion among the people, sufficiently puzzled with the novelty of a change; and very much tend to produce feelings of discontent in the minds of those it would be desirable to bring over to an approval of the change. Such an operation as this would be most difficult, if not entirely impossible, to effect, and may be urged as a further argument against the plan. The solution that has been proposed to meet the difficulty of the two moneys co-existing at the new value, namely, that 6*d.* should be current for $6\frac{1}{4}d.$, appears most unsatisfactory. No amount of reasoning would ever induce a costermonger to give $5\frac{1}{4}d.$ in change for a sixpence on the purchase from him of an article of the present value of a penny, but which would then be estimated at either four or five mils. Indeed, such a method of dealing would inevitably lead the poor into the difficulty of a shilling being equal to 1*s.* $0\frac{1}{2}d.$, a florin = 2*s.* 1*d.*, or a sovereign = 1*l.* 0*s.* 10*d.* My objections on this view of the subject are further strengthened when attention is directed to a particular coin that among others would suffer interference of this nature; I mean the penny, which I regard as of more importance in this discussion than the pound. Take it which way you will, as the poor man's coin, the household coin, or the fiscal coin—the coin of which the pound and all our other money are multiples, every consideration of the important part it plays under our present system, points out the necessity that exists for leaving the penny intact both in name and value, and similar considerations will show the propriety of a non-interference with the halfpenny likewise; yet under the system I am now remarking upon, not only would these two important coins have an altered value, but a ratio quite foreign to the familiar one they now possess is proposed for them, viz., that of 5 : 2, so that the term halfpenny, as impossible to eradicate as the French "sou," would henceforth be a misnomer. I now quote from an address published in March 1855, by the Decimal Association—a society formed for the purpose of carrying out this plan, which says, "The five-mil piece would take the place of the present penny; the two-mil piece of the present halfpenny." I think a great objection presents itself in the obvious irregularity, and consequent confusion, that would arise in the readjustment of the prices of all articles sold at low sums. Wholesale as well as retail transactions must be more or less affected by this irregularity, and I imagine that tradesmen would be in a sort of bewilderment in repricing their goods. I have prepared a list of 65 varieties of shopkeepers and retail dealers, arranged under three divisions:—1stly, those who, it appears to me, would be injuriously affected in this particular by the mil system; 2ndly, those who would be influenced by it in a much less degree; and, 3rdly, those whose calling would be little if at all affected. There are 36 in the first division, 13 in the second, and 16 in the third.—

A List of Shopkeepers and Retail Dealers, arranged in three divisions, according to the probable amount of interference they and their customers would experience from a Decimal Coinage on the plan of £1 divided into 1,000 mils.

1*st Division.*

Bakers.
Booksellers.
Butchers.
Button and trimming sellers.
Chandlers' shops.
Cheesemongers and buttermen.
Chemists and druggists.
Circulating libraries.
Confectioners.
Corn and flour dealers.
Costermongers.
Dairymen.
Dining rooms.
Fancy repositories.
Fishmongers.
Fruiterers.
Furnishing ironmongers.
Grocers and tea-dealers.
Haberdashers.
Hair dressers and perfumers.
Hawkers.
Herbalists.
Marine store-keepers.
Milliners.
Newsvenders.
Oil and Italian warehouses.
Outfitters.
Potatoe salesmen.
Public houses and beer shops.
Seedsmen and florists.
Silk and linen mercers.
Stationers.
Tallow chandlers.
Tobacconists.
Tool shops.
Toy shops.

2nd Division.

Boot and shoe makers.
China and glass dealers.
Cork cutters.
Cutlers and hardware dealers.
Drysalters.
Gas fitters.
Jewellers.
Leather sellers.
Locksmiths.
Music dealers.
Poulterers.
Print sellers.
Wine and spirit dealers.

3rd Division.

Bottle merchants.
Coachmakers.
Coal merchants.
Curiosity dealers.
Frame makers.
Furniture dealers.
Furriers.
Hatters.
Horse dealers.
Musical instrument makers.
Opticians and philosophical instrument makers.
Picture dealers.
Saddlers.
Silversmiths.
Tailors.
Watchmakers.

717. Will you give a little more in detail the process by which you would apprehend that they would be injuriously affected?—I have used the term "injuriously" in reference to those shopkeepers who are comprised in the first division of my list. It will be seen that, more or less, these persons deal in articles priced at a low rate, say from $\frac{1}{2}d.$ to 6*d.* or below a shilling. In the readjustment of such prices, many considerations would have to weigh with the shopkeepers; if he priced every article at a number of mils, just sufficient to cover the old charge, his customers would have reason to complain of what would become sensible to them in a multiplication of purchases; on the other hand, if he adopted a price one mil less he must be a loser by the change. His proper course would doubtless be to charge some things in excess and others in defect; but in this, unless I greatly mistake, his ingenuity would be seriously taxed in arriving at a result equally satisfactory to both parties; moreover, this pricing must have some respect to the sort of coins that might be issued under the new plan. It is to the state of things thus contemplated that I apply the term injurious.

718. Do you consider that the prices of articles supplied by those various denominations of tradesmen have been adjusted to the existing coinage, or that the coinage has been adjusted to the articles?—In a very large number of cases I think that the article has been adjusted to the coinage. The coin rules the price of many things.

719. Then would it not be possible, and would it not be obviously the course to be pursued, that upon the supposition of an alteration in the value of the subordinate coins there would be a new adjustment of the articles to the new value of the coins?—No doubt, in those cases to which I have already referred, a new adjustment would be necessary, in fact, could not from the nature of the case be resisted; but I have already observed that it would not be possible to make a new adjustment that would be devoid of injury to one party or to another.

720. Can you explain that in a practical form?—As an illustration of my ideas in this case, sheet glass is now advertised for sale at 2d. per square foot; under the new money this might be quoted at 8 mils or 9 mils for the same quantity. 8 mils is a price $\frac{2}{2\frac{5}{5}}d.$ less, and 9 mils is $\frac{4}{2\frac{5}{5}}d.$ more than the present charge; the former would involve a loss to the seller of 6*s.* 8*d.* per 1,000 square feet, and the latter a loss to the buyer of 13*s.* 4*d.* on the same quantity: or take the case of a man who spends a shilling in pence, as beer, he is accustomed say to have half a pint of beer on each occasion; if the five-mil piece came to be used in place of a penny, he would then be able to buy but ten of those half pints for his shilling, which practically would be a loss of twopence on every shilling so spent; even if the beer were better, or if he had a little larger quantity of it, still he would consume his five-mil piece where he consumed but a penny; he would therefore, it appears to me, be a loser to the amount of 20 per cent. on all such purchases.

721. But if the pound sterling, instead of being divided into 960 parts, were divided into 1,000 parts, does not that by the very statement of the case show that there would be a somewhat increased subdivisibility of the value to correspond with the values of the articles?—Theoretically it may appear so; but I think, looking at the cases I have just referred to, it cannot be doubted, that in the place of the present penny another coin will come to be used, a single coin, either a four-mil piece, or a five-mil piece. If a four-mil piece is used, when the penny value is depreciated four per cent; if the five-mil piece, then the person who pays it away, pays a larger sum than he has been accustomed to do, in the way I have referred to.

722. But if you had values, the fourth multiple of a mil, and the fifth multiple of a mil value, would it not be practicable, to make the commodities shape themselves to those values, so that you may have, whether in beer, or anything else, a quantity really equivalent in value to the five mils, and another quantity equivalent to the value of four-mils, and so so?—I cannot see it in that light, I am taking the more immediate effects of such a change; and if I comprehend the proposals put forth under this system by its advocates, I do not

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think there would be a four-mil piece and five-mil piece; even if there should be these two coins, one of them would be regarded in the place of the present penny, would in fact be called a penny. I think that the term penny will never be got rid of, and that the coin so selected by the people, would be used by them as they use the present penny, with all its former associations.

723. Is not the real objection to the system this, that it would compel an alteration in the articles themselves to make their value conform to the new values given to the new coins?—Doubtless were such a system of money once established, articles would be so manufactured and arranged as to bring them into conformity with the coinage; but my objection has special reference to the present generation; those who with former ideas of value would have to buy and sell things manufactured in relation to our present mode of computation with money having no interchangeable relation to that displaced, and possibly too with the former coins circulating at a new value.—Proceeding with my objections, I may appropriately urge that the poor and illiterate part of the people would be much puzzled, and exposed to imposition on the part of small shopkeepers, by this interference with the copper money of the country, essentially the traffic money of the peasantry. I have here the weekly expenditure of a Lancashire labourer's family, consisting of the husband, wife, and four children, the total amount of earnings from every source being 15*s.*, and therefore not an extreme case.

	s.	*d.*
2½ pecks of flour	5	7½
2 lbs. of fresh meat	1	0
Yeast	0	1½
2 oz. of tea	0	6
1 lb. of sugar	0	4
1 pint of milk daily	0	7
1 pint of oatmeal	0	1
1 lb. of butter	1	0
1 lb. of cheese	0	6
1 lb. of rice	0	2
1 pint of peas	0	2
Salt, pepper, &c.	0	1
½ lb. soap	0	3
½ lb. candles	0	3
1 cwt. coals	0	8
Sick club	0	1
Schooling for two boys	0	3
	11	8

Any alteration affecting the savings of such people would beget in them feelings of strong dislike, and even of open opposition, to what they would then regard as an uncalled-for change. Such persons would not understand the benefits accruing to accountancy from a decimal coinage, they would view it as a means of lowering their wages, or raising the price of commodities. In corroboration of this view, I would refer to the opinion of Sir John Herschell, the late Master of the Mint, in his evidence before the late parliamentary committee on decimal coinage, No. 532, in which he says —

"It cannot be expected that it should not present itself to the lower classes under a "repulsive aspect; and without allowing a sufficiently long interval for preparation, and "duly familiarizing these classes with the expectation of a change, and giving them an "idea of what that change will consist in, it will be quite sure to encounter a very "formidable resistance."

I have already remarked, that it is improbable we shall ever get rid of the familiar word "penny," in our money nomenclature; the term, on the withdrawal of the present coin, value, $\frac{1}{240}$ of a pound, being applied with its present associations to a piece of either four or five mils, that is, $\frac{1}{250}$ or $\frac{1}{200}$ of a pound; and the popular difficulty must arise of the shilling in the one case, being equal to 12½*d.*, or, in the other, to 10*d.* Taking the latter substitution as the more probable, we have the objection that even though a poor person should obtain a larger quantity of a given substance for his five-mil piece than at present he does for his penny, it would be often a loss to him by compelling him to purchase more than he might need.

724. I do not quite see the force of that argument, for a poor person has the power of purchasing with his four-mil piece a quantity rather less than the value of a penny, and he has the power of purchasing with his five-mil piece a quantity of some little greater value than a penny, would he not then have as multiplied a power of obtaining varying quantities as now?—Take the case of the pint of milk in the labourer's expenditure just referred to, supposing five mils to be its price under the new coinage, 4 mils' worth would be $\frac{4}{5}$ of a pint, a quantity no shopkeeper will sell; to make the case more pointed, suppose that the pint measure should be enlarged 20 per cent. to make it tally with the new penny; in this case $\frac{4}{5}$ of the new pint would still be an unpurchaseable quantity; half pints and quarter pints being the only divisions current among people with every-day ideas. Even the so much praised *système métrique* after many years' use had to submit to the more popular halves and quarters. To take another case: at present, a druggist will not sell less than a pennyworth of any article; under the proposed system, he would either sell a four-mils'

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worth or a five-mils' worth; there is no doubt that he would prefer the five mils, not only from its taking the place of the penny, but from its connexion with the decimal system, the number 5 most obviously being the fittest number for him to take. Now, at present, supposing that a poor person wishes to purchase a drug or other article, the custom is not to sell less than a pennyworth, which not unfrequently happens to be more than is required, and being either thrown away, or becoming deteriorated by keeping, is an absolute loss. If this kind of wrong exists now, it will of course be augmented by increasing the coin which is to come in the place of the penny. If the four-mil piece is adopted in the place of the penny, and it is received on all hands in lieu of it, then the evil I refer to would be diminished, and the difficulty would rather be on the opposite side.

725. What do you mean by saying that the difficulty would be on the opposite side?—By the seller having to bear a loss of somewhat less than 4 per cent. on his pennyworths.

726. I wish clearly to understand why it is you assume that a wrong must necessarily exist. Supposing a chemist finds it expedient to sell rather a smaller quantity than he has been in the habit of selling for a penny, and reduces the quantity to the equivalent value of four mils, will you explain why it is assumed that in that transaction there will necessarily be wrong involved?—I am quoting the practice of the present day, the practice of a retail chemist, which is, not to sell any article for a sum below a single penny. I assume that under the new system he would adopt the same rule, and would not sell any article at a price below five mils, in which case the purchasers would in many instances be subjected to greater wrong than at present, when, if half a pennyworth of a given substance serves their purpose, the residue is wasted, and they thus suffer the loss of a halfpenny.

727. But suppose he gives a somewhat smaller quantity for the four-mil piece?—If a four-mil piece came to be adopted in the place of the penny to rule the price of articles, as that coin now does, he might, and probably would, find it necessary to adopt that as the minimum coin at his counter, and would doubtless then reduce the quantity in bulk to tally with the value of the new penny, so as to retain the same ratio in the profit; still that would involve an actual loss, because he loses the sale, and consequently the profit, of the difference, small as it may be in individual instances: for, suppose that the profit on a single transaction is at present $\frac{4}{3}d.$, under the new arrangement it would be $\frac{5}{5}$ of four mils, equal to $\frac{3}{5}d.$ which would be a loss of $1d.$ on every 40 sales of the kind.—Proceeding with the arguments that present themselves in opposition, I wish further to observe that no satisfactory solution has yet been arrived at in reference to the very grave difficulties connected with postage and receipt stamps, with tolls, ferries, pier dues, and railway fares by the parliamentary trains; with pawnbrokers' interest also, and with a numerous variety of questions of contracts and dues based upon the present penny. I would respectfully invite the attention of this Commission to the evidence, on this part of the subject, of Mr. Headlam, M.P., before the Committee of the House of Commons on decimal coinage. It would be well to remember also that there are not only penny stamps, &c., but twopenny, fourpenny, and other stamps, dues, and fares of this sort. As an illustration, I will take the case of omnibus fares. The fare of an omnibus now is $4d.$; that is the most common fare: under the proposed system that would be exactly equal to $16\frac{2}{3}$ mils; there would be no such coin as thirds of a mil, hence we should say 17 mils—now in what coin would this be paid? Not in 1 cent and 7 mils, for it is impossible to believe that people would be encumbered with such coins. Perhaps it might be paid by 1 cent, a 5-mil piece, and a 2-mil piece, or by 3 mils in exchange for a 2-cent piece; but even that would involve the necessity of carrying about a large quantity of small copper. An omnibus conductor has often great difficulty in giving change in copper at the present time, and you as commonly receive two fourpenny pieces as $6d.$ and $2d.$ as the change of a shilling. Why is it that $4d.$ was fixed upon as the ordinary omnibus fare? Clearly, in this case, the price is ruled by the coin. Had there been a coin of $3\frac{1}{2}d.$, then we should in all probability have had the fares fixed at that rate. When the proprietors raised their charges a few years back, it was from $3d.$ to $4d.$, not because $3\frac{1}{2}d.$ or $3\frac{3}{4}d.$ would not have sufficed, but as a question of convenience of traffic. Now 1 cent would be too low for the fare under the new system, and 2 cents would be a robbery of the public: 2 cents would be $4\frac{4}{5}d.$, very nearly $5d.$ present money. Were it customary to carry a large quantity of copper about, it is not at all impossible that the charges might have been fixed at $3\frac{1}{2}d.$ or $3\frac{3}{4}d.$; but even then, the loss of time in giving change would have proved so irksome as to necessitate an alteration to a more practicable sum.

728. I understand your view to be something of this nature, that for various small sums, from $2d.$ to $6d.$, the coins under the decimal system with which those sums could be paid would be less convenient than those under the present system?—Yes, they would, I think, be found less convenient. From this and similar considerations, I think a larger number of mils would be required in circulation under such a system than of farthings now. Another question of much importance, and one that does not appear to have received the attention it deserves, is that of piece-work—a question of great interest in connection with the pound and mil system both to workmen and employers, and one that would be likely to prove a difficulty to both parties.

729. Can you explain in detail the nature of your objection with regard to piece-work?—It is, I understand, a very extensive practice for manufacturers of various kinds of goods, as of textile fabrics and metal work, to furnish the operative with the material for his labour, and pay him at a stated rate, according to the quantity and quality completed, in the same way that the needlewomen are employed at the ready-made linen warehouses.

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730. I do not quite understand how a decimal coinage would work more inconveniently as to piece-work than the present system?—It appears to me that difficulties are connected with this, similar to those I have already referred to. Assuming, for example, that a penny per given length of work done, say a yard, were to be the remuneration of a workman for a particular kind of work, then if the 5-mil piece should come in its place under a new system of coinage, the workman would naturally expect to receive that rate as his right, although the employer would be a loser to the amount of 20 per cent. by it; and any attempt on his part to reduce the price to 4 mils per yard would raise the opposition of operatives, who would immediately complain that their wages were less for the same amount of labour by 3*s.* 4*d.* on every 1,000 yards of work completed.

731. Suppose we were to take an inversion of the prices, and that we had now a coinage which gave us the fourth multiple and the fifth multiple of the lowest unit, and that work had been habitually served out upon the piece-work principle to be paid for in those coins, and suppose that a new coinage was introduced, abolishing the fourth and fifth multiple of the lowest unit, and substituting one denomination of monies something between those two, do you not think that the complaint would then be raised that we were diminishing the facility of adjusting prices to labour or to piece-work?—No doubt there would be less power of adjusting, but still there would be an alteration, of the same character I am objecting against.

732. Then your objection is merely to the transition, and not to the permanent state?—Merely to the transition; until all classes had forgotten the old, and had got into the practice of the new system. All that I have said in reference to the uninterchangeability of the lower coins under the pound and mil system with those in present use, must be understood as having special reference to the period of transition; but that period would, I fear, be extended through many years.

733. Considering the objections which you have stated seriatim, to the proposed system of Decimal Coinage in the form recommended by the Parliamentary Committee, is there in your estimation any other system of Decimal Coinage by which those objections could be avoided?—Before I proceed to answer that question, I wish to state three more objections to that plan. The first of these has reference to the chief unit of account being divided into so large a number as 1,000 parts. I fear that the majority of persons would experience much difficulty in rapidly forming an estimate, in relation to the pound, of any sum expressed in mils; to say nothing of mental addition, as for example; 879 mils + 768 mils. In those countries which have adopted a system of decimal monies and accountancy, the unit is divided into 100 parts only. I have here a list in illustration.

Belgium,	1 franc	=	100 centimes.
France,	1 franc	=	100 centimes.
Greece,	1 drachma	=	100 lepta.
Holland,	1 florin	=	100 cents.
Naples,	1 ducat	=	100 grani.
Rome,	1 scudo	=	100 bajocchi.
Russia,	1 rouble	=	100 copeks.
Sardinia,	1 lira	=	100 centessimi.
Sweden,	1 riksdalar	=	100 ör.
United States,	1 dollar	=	100 cents.

Where a further decimal subdivision has been attempted, it has been rejected in practice. Now, if the pound sterling were thus centesimally divided the lowest denomination would be of the value of 2·4*d.*, a coin far too large to remain without further subdivision to meet the wants of the poorer class. In fact, complaint is sometimes made that we have not coins of a value sufficiently small to meet all the requirements of traffic. It was to supply this want that half farthings were coined about twelve years back; an experiment, by the way, that has been quoted as a failure, overlooking the fact that the poorer classes never got hold of them, the small shopkeepers, whose interest it is to keep them out of circulation, not providing a supply from the Mint, and the poor being utterly unable to do so, £5 worth being, if I am correctly informed, the lowest amount supplied by the Mint regulations. I am opposed, then, to the pound as the chief money of account, as being of a value too high to admit of its hundredths, beyond which I would not advance, being represented by coins of a value not higher, at most, than the present penny.

734. Do you consider that the decimal coinage would work practically with more than two monies of account, namely, the highest and the lowest unit?—It is difficult to say to what form any particular system would be reduced in practice. In the case of a centesimal division of the chief unit, I think when the system was fully received, and in perfect operation, that two monies of account, the highest and lowest, would be the preferable form; but supposing a millesimal division, such as that proposed, I do not think such a course would be adopted in general traffic.

735. Do you know any instance where such a system is in operation?—In Portugal accounts are kept in milrees or 1,000 rees; but the lowest coin in circulation is of the value of five of these units. In China, likewise, accounts are kept in cash, 1,000 cash being called a tael.

736. Do you not think that in case you have a division of 1,000 steps between the highest and lowest unit, you must necessarily take altogether three, if not four separate monies of account?—I think so, especially for the convenience of retail traffic.

737. Do you not think from that that there must inevitably arise a considerable degree of inconvenience in calculation and liability to error?—I think there would be some increased liability to inaccuracy, particularly in mental calculations, consequent upon having so large a division of the chief unit as 1,000.—Another objection presents itself in the fact that under this plan a greater number of figures would be required in accountancy than under that in present use, or others that have been proposed for a decimal coinage. This must be evident from the consideration, that it proposes to keep accounts in 1-1000ths of a pound, or a value less than a farthing; whereas at present it is not usual to enter any sum less than a penny. I have made a calculation in reference to this question which I beg permission to submit to the Commission.

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All Sums of Money rising evenly in Pence.	Require in *present system* the following total numbers of Figures to express them.	In the proposed system of £1 divided into 1000 *Mils.*	In any of the proposed systems based upon the *Penny.*	Advantage of *present system* over *Mils.*	Advantage of a *Penny basis* over *Mils.*	Advantage of a *Penny basis* over present system.
£ s. d.						
From 1*d.* to 3	2	2	2	0	0	0
„ „ 10	9	16	9	7	7	0
„ „ 2 0	39	44	37	5	7	2
„ „ 8 4	203	272	189	69	83	14
„ „ 1 0 0	627	692	609	65	83	18
„ „ 4 3 4	3393	3732	2889	339	843	504
„ „ 10 0 0	8547	9332	8489	785	843	58
„ „ 41 13 4	43973	47332	38889	3359	8443	5084
„ „ 100 0 0	109347	117332	108889	7985	8443	458
„ „ 416 13 4	539973	573332	488889	33359	84443	51084
„ „ 1000 0 0	1333347	1413332	1328889	79985	84443	4458
„ „ 4166 13 4	6399973	6733332	5888889	333359	844443	511084
„ „ 10000 0 0	15733347	16533332	15688889	799985	844443	44458
„ „ 41666 13 4	73999973	77333332	68888889	3333359	8444443	5111084
„ „ 100000 0 0	181333347	189333332	180888889	7999985	8444443	444458
„ „ 416666 13 4	839999973	873333332	788888889	33333359	84444443	51111084
„ „ 1000000 0 0	2053333347	2133333332	2048888889	79999985	84444443	4444458

My concluding objection is one which has reference to difficulties which, I believe, would be found to exist in arithmetical operations during the period of transition from the old to the new system of 1,000 mils. to the pound. It seems admitted on all hands that no attempt to force people suddenly to adopt the language of a decimal coinage would be successful in this country; that it must win its way as it did in the United States, where merchants and tradesmen continued to use the old system of pounds, shillings, and pence long after dollars and cents had become the only legally recognized money of account. No doubt a similar latitude would be necessary in this country, the freedom of whose institutions renders improbable the idea that its money system, established for so many generations, could be swept away at a blow. It is in accordance with this idea that an advocate for the pound and mil system, Mr. Jellicoe, in his examination of objections against that plan observes, "It is not denied, but that during this transition state some "embarrassment will arise, nor can any change whatever be made without; it is the "natural penalty to be paid before a better order of things can be attained, and for the "purpose in question the payment of such a penalty is well worth the while. The prin-"cipal inconvenience, however, will arise in accounting. Thus, bankers and others will, "no doubt, receive coins of the old and new denominations at the same time, and will have "to pay cheques and bills drawn in both currencies. But a little management will suffice "to remedy in a great measure any complication which may arise from these sources. It "will be necessary only to add in account books as now constructed one column for the new "system of coinage, and make the entries accordingly. Such an arrangement as the "following, for instance, would meet any temporary difficulty of this kind:—

	£	s.	d.	£	f.	c.	m.
A. B.	25	7	6				
C. D.	—	—	—	100	· 7	3	0
E. F.	16	8	6				
G. H.	—	—	—	50	· 6	8	2
I. K.	—	—	—	75	· 3	5	0
	152	16	0	226	· 7	6	2

"The totals in each case being ascertained, the shillings and pence can be easily converted "into corresponding values in the new system, and the sum of the whole then taken in that "character." From these considerations it appears to me that difficulties will unavoidably arise whenever a computation made in reference to the one system is transposed to the form of the other. I submit the following instances in illustration: a person with, let us suppose, a strong predilection for old terms, agrees to the purchase of 5,000 yards of wire fencing at "2½*d.*" per yard, which he calculates would come to 52*l.* 1*s.* 8*d.*, whereas the seller keeps his books on the new system, and taking 11 mils as the representative of 2½*d.* would consider himself entitled to 55*l.*

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Or suppose it desired to calculate the value on the new system of 54 tons 12 cwt. 1 qr. at $\frac{1}{4}d.$ per lb., one person might work it thus :—

tons.	cwt.	qrs.	
54	12	1	
20			
1092			
4			
4369			$\frac{1}{4}d.$ = 1 mil by the tables.
28			
34952			
8738			
122332 lbs. at 1 mil = £122·332			

A second might proceed thus,—

$\frac{1}{4}d.$ per lb. = 2*s.* 4*d.* per cwt. = ·116 mils.
and 54 tons 12 cwt. 1 qr. = $1092\frac{1}{4}$ cwt.

	·116
	6552
	12012
	29
Ans.	£126·701

Or, a third might work the same question as follows:—2*s.* 4*d.* per cwt., as above, = 2*l.* 6*s.* 8*d.* per ton = 2*l.* 333 mils, hence,—

10 cwts.	$=\frac{1}{2}$	2·333
		54
		9 332
		116 65
2 „	$=\frac{1}{5}$	1 166
1 qr.	$=\frac{1}{8}$	233
		29
	Ans.	£127·410

Here then is the same question worked in different ways with a different result in each case, and those results incorrect, the precise value being 127*l.* $429\frac{1}{6}$ mils. Instances of this kind, I think, would not unfrequently occur in the case of the unskilled computer, tending to produce feelings of dislike to a system that he would look upon as involving uncertainty in its arithmetic. Even when made acquainted with the method of correction to be employed in such cases he would in all probability object to the additional labour involved. Under such a state of things it is not difficult to believe that old ideas and methods would be had recourse to, and the period of change indefinitely lengthened. In support of my ideas on this head I adduce the following :—At the general examination of training schools at Christmas 1854 two sections of the questions in arithmetic for the "males" were, by Professor Moseley, H.M. Inspector, devoted to the subject of decimal coinage on the pound and mil system. From complaints made in a publication of the time, the result seems to have been unsatisfactory, the candidates being "plucked." It subsequently came to my knowledge that several certificated masters who had met together were equally perplexed by the contradictory results they obtained. The questions in one of the sections I now refer to were as follows:—"Section III. Express the sums of money mentioned in the following questions, in the decimal coinage; work the sums decimally, and reduce the answers to the present currency :

"1. A spoon costs 7*s.* 9*d.*, how many dozen can be bought for 44*l.* 8*s.* 3*d.*?

"2. A man who owes 2,348*l.* pays 12*s.* $9\frac{1}{2}d.$ for every pound which he owes; how much does he pay in all?

"3. What sum of money is that which being lent at simple interest will in 8 months amount to 297*l.* 12*s.*, and in 15 months to 336*l.*, and at what rate per cent.?"

Concerning these questions I beg leave to append a short extract from my letter on the occasion, published in the "Liverpool Mercury" of Feb. 2d 1855 :—"In question 1 we have to determine how many dozens of spoons can be purchased for 44*l.* 8*s.* 3*d.* at 7*s.* 9*d.* for one spoon; the correct answer to which will be found to be $9\frac{2}{3}\frac{0}{7}\frac{5}{2}$ dozen, or 9·551075+ Now let us proceed to obtain a solution on the pound-and-mil system : 7*s.* 9*d.* expressed decimally is exactly £·3875, that is a sum between 387 and 388 mils, one of which must be determined on as the *fixed* representative of 7*s.* 9*d.* in the Committee's plan. In like manner 44*l.* 8*s.* 3*d.* (= £44·4125 exactly) would be represented by either 44*l.* 412 mils, or 44*l.* 413 mils. Let the question now be worked out with these values, and it will be found that the

results of four solutions will be four *different* answers and *all of them incorrect.* The second question proposed is as follows:—'A man who owes 2,348*l.* pays 12*s.* 9½*d.* for every pound he owes; how much does he pay in all?' The correct reply to this is, 1,501*l.* 14*s.* 10*d.*, but worked on the proposed system we obtain 1,500*l.* 7*s.* 5½*d.*, or 1,502*l.* 14*s.* 5*d.*, according as we take 6 florins 3 cents 9 mils, or 6 florins 4 cents to represent 12*s.* 9½*d.*, the exact value in decimal *fractions* of which is ·639513, where the last three is to be repeated *ad infinitum*, and by the use of which, of course, a correct result may be obtained, but at such an additional expense of labour that the friends of the Decimal Association have not attempted to exhibit so awkward an illustration of their 'labour-*saving*' plan in those examples which have been brought forward by them."

738. Will you now have the goodness to state whether you think there is any other form of decimal coinage which could be introduced into this country, exposed to fewer objections, and involving greater advantages than the proposed Parliamentary scheme?—I believe I have examined all the plans that have been proposed for effecting the change, and have come to the conclusion that a decimal system of coinage may be introduced into this country with fewer objections than belong to any other method, on the basis of the present penny, either by creating a new coin of the value of 10 pence as the chief money of account, similar to the plan of the French system, involving, of course, the subdivision of the penny into 10 cents; or, as I prefer it, and in the form I have advocated the plan, by advancing another step to a coin of 10 tenpennies for the prime unit of account, producing a system analogous to the United States dollar of 100 cents, of which it would be very nearly the double. The former of these plans would produce a system of decimal coinage for the United Kingdom of the form—

1 tenpenny = 100 cents;

and the latter might be quoted as—

1 imperial = 100 pence.

I have read papers on this subject before the Statistical Society and the Society of Arts, to which I respectfully solicit the attention of the Commission. From a lecture delivered before the Metropolitan Society of Schoolmasters at Westminster last year, and published in the "Journal of the Society of Arts," I beg to make the following extract, as more fully explaining my views on this head:—

"For some years past I have been a humble advocate for a decimal coinage. As to the plan to be adopted, I did not think any was more desirable than that which seeks to subdivide the 1*l.* sterling into 1,000 parts—a plan supported by men ranking high in science and mercantile matters; a plan that would render perfect that very simple method for the transposition at sight of shillings and pence to three decimal places of a £, so common in use among actuaries and others; a plan which seems to require a shaving only from every farthing, restored as an additional coin in the sixpence, which would count 25 instead of 24. The result of a somewhat careful consideration of the subject has, however, shown me that it is not a question of accountancy only, but one in which numerous important interests are concerned—interests that would be best consulted and advanced by a decimal system founded upon the *penny*. The conclusions I then arrived at were:—

"1. That the new system should be one free from any liability to give rise to injustice or confusion among the poor and illiterate classes of the community, thereby creating a prejudice against its use.

"2. That it should not necessitate the withdrawal of the most useful and popular coins already in circulation, and with which, from habit, every one is familiar.

"3. That it should possess the greatest possible clearness in expressing its coins in the old money, and *vice versâ*.

"4. That there should be but few coins of account, and those of a convenient size; and, if possible, of different metals.

"5. That it should be an experiment which might be withdrawn without difficulty if found inconvenient in practice.

"6. That the unit of account should be a gold coin of moderate value. And,

"7. That its lower denominations of account should range in value as nearly as may be with the units of currency of such foreign states as we have most important relations with.

"In accordance with these requirements, I advocated the tenpenny plan just explained, with the modification of making the unit of account a gold coin* of the value of 10 tenpences, the effect of which would be to advance the unit of account nearer its present value, and thus aid in getting rid of the maudlin feeling which some have relative to reckoning in tenpennies, and the fears of others about a silver monetary standard. This *imperial unit*,* or *imperial*, as I have termed it, might then be put forth as the olive branch by which to reconcile the two chief contending elements of this question, the penny and the pound, between which it seems now acknowledged this *questio vexata* rests. The penny would remain intact, and the pound, also unaltered and uninterfered with as a *coin of currency*, numerically represented by 2·4.—It will be seen how this plan fulfils the seven conditions previously laid down:

* It would not be necessary to coin all our gold in this form,—2 or 5 imperials might be issued for ordinary use.

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"1stly. No confusion or mistrust would arise among the lower classes of the people, since the new coins could be represented in the old, while the penny would remain unaltered in name and value.

"2ndly. The old coins might continue in circulation for any length of time that might be found necessary.

"3rdly. The two systems are obviously convertible with great simplicity, and all the old coins easily represented by the new, and the reverse, thus—

Coins of the present System.		Value in proposed System.				
	Value in pence.	Imp.	tenp.	p.		Imp.
The penny	1	0	0	1	or	·01
The three-penny piece	3	0	0	3	,,	·03
The four-penny piece	4	0	0	4	,,	·04
The sixpence	6	0	0	6	,,	·06
The shilling	12	0	1	2	,,	·12
The florin	24	0	2	4	,,	·24
The half-crown	30	0	3	0	,,	·30
The crown	60	0	6	0	,,	·60
The half-sovereign	120	1	2	0	,,	1·20
The sovereign	240	2	4	0	,,	2·40

"4thly. There would be but three coins of account, whereas the Committee names four,† so that two places of decimals would represent tenpennies and pence, or simply pence, if preferred, and thus the absence of a third column of figures would materially lessen the labour of addition. Also the new coins would be of different metals, and of a convenient and, at the same time, a different size, thus precluding all chance of mistake in their use. The imperial would be a little smaller than the present half sovereign, and the tenpenny somewhat less than a shilling piece.

"The 5th and 6th requirements are also equally fulfilled. And—

"Lastly. It will be observed that great facilities would be afforded to travellers and others in more easily effecting exchange operations. The half-imperial would represent the United States dollar, and the hard dollar of Spain and the South American States; the tenpenny would equally approximate to the French and Belgian francs, and other foreign coins of the same value; while the Dutch guilder, and the florin of Zollverein, &c., would be indicated by two tenpennies. For this and other reasons it would doubtless be found convenient to coin such pieces as—

	s.	*d.*
The half-imperial, or dollar, value in present money	4	2
,, forty-penny piece	3	4
,, twenty-penny piece, or guilder	1	8
,, five-penny piece	0	5

"Those could be struck in silver, and would eventually supply the place of those at present in circulation.

"A victoria, equal to ten imperials, or 1,000*d.*, answering to the double eagle of the United States, would likewise be found useful, and might be made a handsome commemorative gold coin, considerably smaller than the present crown piece.

"The plan, then, which I respectfully advocate, may be popularly termed that of the double dollar with the double cent."

739. The adoption of the penny as the basis, or the 10 penny and the 100 penny, necessarily involves the abandonment of the pound sterling as a coin of account, does it not?—Yes, as a coin of account; but it might remain current unaltered in value for any length of time.

740. You are aware, are you not, of the very strong opinions that have been expressed as to the necessity of not abandoning the pound sterling as a money of account?—I am.

741. Do you concur in those opinions?—Not entirely. I think that if the difficulty were looked full in the face, it would not be found so formidable as the advocates for the pound-and-mil plan have represented it. It is not to be denied that it presents a great difficulty in the way of a system of decimal coinage based upon the penny, that there would be much unwillingness on the part of traders and monied men of all ranks to throw overboard the pound, and reckon in imperials, still more in tenpennies; but then if we are to have a decimal coinage in this country, we must meet this sort of difficulty at one end

* Elsewhere I have stated that when the old system of money had ceased to be used, it might be well to restore the familiar names of pounds, shillings, and pence, in accordance with Mr. Tate's suggestion in the *Times* of December 11th 1853, who proposed "4 farthings = 1 penny; 10 pence = 1 shilling; 10 shillings = 1 pound." Mr. J. H. Turner, of Cambridge, in his pamphlet entitled "The Penny Considered as the Foundation of a Decimal Currency," agreeing with this idea, says, "I propose that a silver coin of ten pence shall be, and shall be called, 'a shilling new currency,' and that a gold coin of 100 pence shall be, and be called, 'a pound new currency.'"

† It would, I think, be better to ignore halfpence and farthings in account as is done at present, but they should still be current for the use of the poorer classes; if found desirable, the farthing might be withdrawn and the penny divided into ten *mites*.

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of the scale or the other. There is no help for it; either the pound or the penny must be displaced from account; and I respectfully contend that those whom the change would more especially benefit are not only better able to cope with this difficulty of the pound than are the mass of the people with the still greater one of the penny, but, as a matter of justice, ought to bear the chief burdens of the change. It was upon this principle that the alteration was effected in the United States, when pounds, shillings, and pence were changed to dollars and cents—the pound being entirely abolished.

742. Would there not be a very great inconvenience in stating sums of money, large sums of 1*l.* and upwards, in the new form in which they must be stated, if you dealt with 100*d.* as the highest unit of account?—I do not apprehend that the inconvenience would be so great as might be anticipated; such sums of money would be represented in the proportion of 2·4 : 1, the operation of conversion being essentially that of reduction to pence.

743. Considering that the whole object of the adoption of a decimal coinage is to give facility, and to save time and labour in account keeping, would not the fact of having to render large sums in the number of pence instead of rendering them in the number of pounds tend materially to increase the labour, and to occupy more time?—It would at first, but the same difficulty applies to the other system.

744. How does it apply to the other system, in which the pound sterling, and multiples of the pound sterling, are retained as they now exist?—The operation of reducing shillings and pence to mils would prove as difficult to the ordinary class of persons; perhaps even more so, for every schoolboy knows how the one is to be done, whereas the rule for the other is known only to a few. Moreover, the number of operations of this kind relating to the pound would bear no comparison with those that relate to small sums of shillings and pence: I am looking at the question as affecting the great masses of the people.

745. If you alter the pound sterling, and substitute a new form of representation which involves more figures, will you not, in the representation of the pound sterling and all its multiples, be letting in an increase of time and trouble, while you are endeavouring in the statement of fractional parts of the pound sterling to introduce a saving of time and trouble?—To those who would have to deal with the pound, and, of course, they are very numerous, there would be simply the increase of labour necessary to express that money in the new denomination; when the system came to be fully established, this extra labour would be no longer necessary, any more than would be needed the reduction of pence to mils in the other case. As to there being permanently an increase of labour, on the supposition of more figures being needed under a system based on the penny, the fact is quite the other way; and I refer to the table I have already laid before the Commission in a former reply (No. 737), in which is shown that the number of figures required in accountancy and a decimal coinage founded on the penny is less than under either the pound-and-mil plan, or that in present use. It is there shown that the number of figures saved upon the sum of all figures below 100,000*l.*, by the use of the plan I advocate, would be somewhat less than $\frac{1}{4}$ per cent. over that now used; while the additional figures in the pound-and-mil system would amount to about $4\frac{1}{2}$ per cent. On smaller sums, such as may be supposed to be entered in the books of tradesmen generally, the sum of all figures below 100*l.*, would give a saving of a little more than $\frac{2}{3}$ per cent. for the penny, and an increase of nearly $7\frac{1}{3}$ per cent. for the mil system. On still smaller sums, representing the dealings of retail traders, the sum of all figures below 10*l.* would give for the decimal pence a saving of rather more than $\frac{2}{3}$ per cent., and for the pound-and-mil plan an increase of nearly $9\frac{1}{4}$ per cent. Whichever plan is adopted, there must, I conceive, be a certain amount of difficulty to be met during the period of transition. The question is, whether the ordinary people should have that difficulty thrown upon them, or whether it should be made to rest upon those who, by education and practice, are better able to cope with it.

746. What do you consider to be the great predominant advantages of the penny or the tenpenny scheme over what is now termed the pound-and-mil scheme?—The advantages of a decimal system of coinage rising from the penny over one descending from the pound, particularly in the phase I have ventured to advocate it, may be summed up in its freedom from those objections that have been raised against the latter in the course of this examination, and in its agreement with the conditions given in the extract from my Westminster lecture, which it is permitted me to include in this evidence. I will state under five heads what appear to me to be the predominant advantages of the penny basis:—

1st. It is a more popular method of introducing the decimal system into this country than that by the subdivision of the pound sterling into mils; concerning which scheme I entirely agree with the forcible remark in the "Times" leader of June 15, 1855, that "it is deficient in that element of popularity which goes for so little in devising a scheme, and for so much in carrying it out." This greater popularity attaching to the penny basis may be viewed under two aspects:—a greater simplicity in presenting the question to the understanding of the common people, and a less amount of disturbance in their habits and prejudices. I may quote as a singular proof of the former, the case of an article which appeared a short time back in the "Household Words," where the writer, whilst advocating the pound-and-mil system, finds it necessary, in order to bring the subject to the comprehension of the general reader, to use at some length the illustration,—ten pence make one shilling, and ten shillings one pound.

2nd. Its freedom from uninterchangeable coins, and, consequently, from the necessity for depreciating or appreciating the existing values of copper money.

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3rd. The facilities offered in the penny for further subdivision by actual coins if found desirable, to meet minute and subdivided values.

4th. The greater similarity with the money of countries with which we have important commercial relations; and,

5th. The smaller number of figures that would be required in accounts.

747. Do you think it more desirable to retain the present system of coinage than to adopt the decimal principle in the form recommended by the Parliamentary Committee?—I do.

748. You think it desirable to remain as we are, rather than to adopt the recommendation of the Parliamentary Committee, with the objections to it which you have stated to exist?—Having respect to the objections which I believe to exist, that is my opinion.

749. But in case of the adoption of the penny or the tenpenny basis, you think that the decimal system will be superior to the present?—Yes. I think that a system of money formed on the principle of a decimal progression would, when established, be found superior to that now in use in the country; and that a plan based upon the penny is the only proper way of introducing it into the United Kingdom.

750. Is there anything else that you wish to submit to the Commissioners as bearing upon this subject?—Perhaps I may be permitted to remark that I have turned my attention to the question of the conversion of the old to the new money, and *vice versâ*, that would during the period of a change be found necessary—the supposed system being that of the penny, and I furnish rules for the purpose:—

1st, to convert the old money into the new.

Double the number of pounds in the given sum; repeat the same operation with this latter, and place it underneath the former one figure to the right, and under these two place, also one figure to the right, the number of pence in the odd shillings and pence—the sum of the three lines will be the total number of pence in the whole sum:

Example. Convert 87*l.* 15*s.* 9*d.* to pence.

Operation	174	(= twice 87)
	348	(= twice 174)
	189	(= 15*s.* 9*d.*)
Ans.	21,069 pence = 2106·9 tenpennies = 210·69 imperials.	

So 13*l.* =

26
52

3,120 pence.

2nd, to reduce new money to the old.

Cut off the last two figures for pence, then one-half of the remaining number as pounds diminished by $\frac{1}{6}$ of itself, will, with the addition of the pence, be the sum required.

Example. What is the value of 210·69 imperials, or 2106·9 tenpennies, or 21,069 pence?

Operation	105	(=$\frac{1}{2}$ of 210)
Subtract	17 10	(=$\frac{1}{6}$ of 105*l.*)
	87 10	
add	5 9	(=69 pence)
Ans.	£87 15 9	

This operation would be greatly facilitated by committing to memory the following table:—

£	*s.*		One sixth of *s.*	*d.*
0	10	is	1	8
1	0	„	3	4
1	10	„	5	0
2	0	„	6	8
2	10	„	8	4
3	0	„	10	0
3	10	„	11	8
4	0	„	13	4
4	10	„	15	0
5	0	„	16	8
5	10	„	18	4

Those who have not tried these methods are not aware how much less difficult such processes are than might at first appear, and I may mention that in a single lesson, a class of boys were enabled to perform them with rapidity, and in many cases, after a little practice, even mentally. Tables might, if preferred, be formed for the same purpose. To pave the way for this system of decimal coinage, it would be desirable to cause the amount of all

invoices and accounts to be written in pence, below their present totals, and subsequently to extend the same rule to each item. This would prove a means of familiarizing the public with such representatives of value, and lead them to discover the advantages to be derived from the adoption of the decimal coinage. I subjoin three tradesmen's bills, each made out in the present system, and those of a decimal form derived respectively from the penny and the pound.

An actual Butcher's bill—present system.

			s.	d.
2 lbs. 11 oz.	Beefsteak at $9\frac{1}{2}d.$	per lb.	2	$0\frac{1}{2}$
9 „ 7 „	Round of beef at $8d.$	„	6	$3\frac{1}{2}$
6 „ 2 „	Loin of mutton at $9\frac{1}{2}d.$	„	4	10
9 „ 14 „	Leg of mutton at $9d.$	„	7	5
$\frac{1}{2}$ „	Suet at $8d.$	„	0	4
			£1	0 11

The same with the Imperial of 100 pence.

			d.
2 lbs. 11 oz.	Beefsteak at $9\frac{1}{2}d.$	per lb.	$24\frac{1}{2}$
9 „ 7 „	Round of beef at $8d.$	„	$75\frac{1}{2}$
6 „ 2 „	Loin of mutton at $9\frac{1}{2}d.$	„	58
9 „ 14 „	Leg of mutton at $9d.$	„	89
$\frac{1}{2}$ „	Suet at $8d.$	„	4
			2 51

The same with the Pound of 1,000 mils.

			m.
2 lbs. 11 oz.	Beefsteak at $39m.$	per lb.	102
9 „ 7 „	Round of beef $33m.$	„	314
6 „ 2 „	Loin of mutton, $39m.$	„	241
9 „ 14 „	Leg of mutton, $37m.$	„	370
$\frac{1}{2}$ „	Suet, $33m.$	„	16
			1 043

A Grocer's bill—present system.

			s.	d.
1 lb.	Mixed Tea at 3/4	per lb.	3	4
$\frac{1}{2}$ „	do	„ 4/8 „	2	4
2 „	Coffee	„ 1/8 „	3	4
4 „	Sugar	„ $5\frac{1}{2}d.$ „	1	10
$1\frac{1}{2}$ „	Currants	„ $10\frac{1}{2}d.$ „	1	$3\frac{3}{4}$
3 „	Raisins	„ $7d.$ „	1	9
			13	$10\frac{3}{4}$

The same with the Imperial of 100 pence.

			d.
1 lb.	Mixed Tea at $40d.$	per lb.	40
$\frac{1}{2}$ „	do.	„ 56 „	28
2 „	Coffee	„ 20 „	40
4 „	Sugar	„ $5\frac{1}{2}$ „	22
$1\frac{1}{2}$ „	Currants	„ $10\frac{1}{2}$ „	$15\frac{3}{4}$
3 „	Raisins	„ 7 „	21
			1 $66\frac{3}{4}$

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The same with the Pound of 1,000 mils.

			m.
1 lb.	Mixed Tea at	166*m.* per lb.	166
½ „	do.	„ 233 „	116
2 „	Coffee	„ 83 „	166
4 „	Sugar	„ 23 „	92
1½ „	Currants	„ 43 „	64
3 „	Raisins	„ 29 „	87
			691

An actual Linendraper's Bill (which shows that the practice prevails at present of quoting the prices of such goods in pence).

			s.	d.
2½ yds.	Flannel at	21½*d.*	4	5¾
3 „	ditto	„ 18¾	4	8¼
1½ „	Alpaca	„ 11¾	1	5¾
4½ „	ditto	„ 16½	6	2¼
4 „	Calico	„ 7½	2	6
16 „	Plaid	„ 12¾	17	0
9 „	Lining	„ 2¾	2	0¾
1½ „	ditto	„ 6¾	0	10¼
4 pair	Hose	„ 18¾	6	3
2 „	ditto	„ 16¾	2	9½
			£2	8 3½

The same with the Imperial of 100 pence.

			d.
2½ yds.	Flannel at	21½*d.*	55¾
3 „	ditto	„ 18¾	56¼
1½ „	Alpaca	„ 11¾	17¾
4½ „	ditto	„ 16½	74¼
4 „	Calico	„ 7½	30
16 „	Plaid	„ 12¾	2 4
9 „	Lining	„ 2¾	24¾
1½ „	ditto	„ 6¾	10¼
4 pair	Hose	„ 18¾	75
2 „	ditto	„ 16¾	33½
			5 79½

The same with the Pound of 1,000 mils.

			m.
2½ yds.	Flannel at	89*m.*	223
3 „	ditto	„ 78	234
1½ „	Alpaca	„ 49	74
4½ „	ditto	„ 68	306
4 „	Calico	„ 31	124
16 „	Plaid	„ 53	848
9 „	Lining	„ 11	99
1½ „	ditto	„ 28	42
4 pair	Hose	„ 78	312
2 „	ditto	„ 69	138
			£2 400

These examples likewise show the difficulty I have referred to, of so pricing goods under the pound-and-mil plan as to avoid loss on one side or another.

Tuesday, 17th February 1857.

The Right Hon. the Lord MONTEAGLE OF BRANDON in the Chair.

T. C. MOSSOM MEEKINS, Esquire, examined.

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751. (*Chairman.*) YOU are a member of the Bar?—Yes.

752. Have you had occasion to turn your attention to the question of coinage, and, above all, to the suggested changes from the present system to a decimal system?—Yes.

753. You are the author of a little pamphlet* which has been laid before the Commission?—Yes.

754. Do you consider the present state of the British coinage to be satisfactory for the purposes of exchange and of account?—Quite the reverse.

755. Will you state the objections which you consider to exist to the present system of our coinage?—I think it is unnecessarily complex, that it leads to great inaccuracy in accounts, and that it needlessly lengthens the period necessary for education. Under a decimal system there need be no compound addition, compound subtraction, compound multiplication, or compound division.

756. In those respects do you consider that there would be any considerable advantages from a change, any greater simplicity, and greater absence of error?—I think that commerce would derive very great advantages from the adoption of a decimal system, and that it would give a sensible impetus to education.

757. On what is that opinion founded; on the theory of the case, or upon any observations which you have had the means of making in countries where decimal systems prevail?—Mainly on the theory of the case; for instance in exchanges, in case of an international decimal system being adopted there would be no such thing as the "par of exchange;" under such a system the calculation of the "cross exchanges" and the "arbitrations of exchange" would be very simple operations.

758. (*Lord Overstone.*) Under the supposition of an international system?—Yes.

759. (*Chairman.*) The terms of the Commission under which we are appointed do not allow us to enter into the consideration of an international scheme. Upon what facts do you rely in support of these conclusions?—I think it must be obvious to all who have perused any books in which a decimal system is adopted, the great facilities it affords for rapidly arriving at results, as compared with our own system. When one is reading a book in which the English system obtains, one finds it necessary very frequently to lay down the book, and enter into a calculation; whereas, under a decimal system, one can continue to read and yet carry on considerable mental calculations, whereas there is the greatest difficulty of doing so under our system.

760. Do you consider that mental operations would be more easily carried on as applicable to decimal numbers than they are according to our mixed system at the present time?—Clearly. It would very materially facilitate mental calculation and diminish the liability to error. That was I believe given in evidence before the Decimal Coinage Committee which sat in 1853.

761. Can you give us any examples in which, for the purposes of facilitating arithmetical operations, a decimal system is more or less adopted, in preference to the mixed system now in use, in relation to the British coinage?—I believe at the Bank of England they have adopted a decimal system of computing gold, and I have been told by an actuary of one of the largest insurance companies, that he uniformly adopts the decimal system; of course, being a barrister, my observations in respect to mercantile matters are limited; they rarely come under my own cognizance.

762. Suppose it conceded that obviously in the higher use of numbers for calculation, such as enter into the calculations of actuaries in many instances, the decimal system might be more advantageous, more simple, and less liable to error, do you think it would necessarily follow that in the simple operations in which figures, in relation to coins are used, the decimal system would necessarily be productive of benefit, or do you think that the same rule would apply to the higher and to the lower use of figures?—I think in the lower and more ordinary course of usage of figures it would apply with perhaps tenfold force. In retail dealings, I believe meat in London is sold at perhaps sums varying from 8*d.* to 11*d.* a pound.; take it at 9½*d*;—nine pounds thirteen ounces, at that rate, would puzzle most men, I think, to answer what the sum was off hand; whereas, if we had a decimal system in retail dealings, the most uneducated man, of the most ordinary capacity, would have little difficulty in making most of calculations which occur in retail transactions.

763. Do you not consider that amongst the class you refer to there may be certain conveniences arising from the simple process which is, more or less, connected with the system of numbers capable of binary division, by which a half, and a quarter, and half quarters are more easily taken under our present system than under a decimal system?—

* "Decimal Coinage, should it be International?"—London, Bell and Daldy, 1856.

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It might be so; but the divisions in our system of weights and measures go beyond a half quarter; they go to $\frac{1}{10}$, and even beyond that. When you come to $\frac{1}{16}$ it is a very different thing, or $\frac{1}{12}$.

764. (*Lord Overstone.*) Will you explain what you mean?—I think, if you carry out the duodecimal system, you must carry it out as a whole; you cannot adopt one system for numerical notation, another for weights and measures, and another system for monies. Our present system of money is a medley of three systems. If we adopt a duodecimal system we should have, 12 farthings one penny; 12 pence one shilling. and 12 shillings one pound. When you mix up two systems, you make "confusion worse confounded."

765. Will not that be the state of things if we introduce a decimal system of coinage, retaining our present system of weights?—I think, unless the introduction of a decimal system of coinage was followed by a decimal system of measures and weights we should lose nine tenths of the advantage.

766. You think that a decimal system of coinage, unless it is accompanied by a decimal system of weights and measures, would rather increase the confusion than diminish it?—I think it would very materially diminish the confusion; at the same time I say that we shall lose nine tenths of the advantages that we might derive if we do not adopt a decimal system of weights and measures at the same time that we adopt a decimal system of monies.

767. From your view of the advantages of a decimal system of coinage do you consider it with reference to account keeping, or do you consider it with reference to coinage?—Principally with reference to account keeping and mental calculation.

768. The advantage of a decimal system in mental calculation, I presume, will depend upon what that decimal system is. Do you approve of the proposed decimal system, the pound and mil scheme?—I believe that any decimal system would be preferable to our present system. I would prefer any decimal system to the present; but I think there are objections to the pound and mil scheme which in my mind are insuperable.

769. Have you ever compared the present system of our coinage with the proposed pound and mil scheme, with reference to the comparative facility of enumerating the different sums in the mind, and not in writing?—My objections to the pound and mil scheme, as far as the enumeration of sums in the mind is concerned, is, that it has three decimal places; I think that is an superable objection. All decimal systems that have been adopted hitherto have had but two decimal places.

770. With respect to the facility of mental calculation, are you prepared to state to this Commission any system of decimal coinage which shall be equally ready and convenient for the expression, say of 10*s.*, 5*s.*, 2*s.* 6*d.*, and 1*s.* 3*d.*; or can you state any decimal system which will represent those sums in a form in which it will be more easy to add up a total sum than they can be added up in the present form of our coinage?—I think, for instance, under the American system, that those sums could be added up with infinitely more facility than under our system.

771. Can you state what would be the form in which they would be represented under the American system?—I have a Table of the American system that I should wish to hand in. It shows that all our present coins can circulate under the decimal system, with the exception of the threepenny and fourpenny pieces.

A Table was handed in. See Question 797.

772. Do you think that this Table sets forth the numerical representation of the given sums in a form more easily added up than they are under our present system?—I should say so, unquestionably. Men who have gone to America, after residing in this country, uniformly say that they have had no difficulty whatever in coming into the American system, and even the most uneducated affirm that they find infinite facility in the American system as compared with our system.

773. You have stated in your evidence, that, according to your judgment, the decimal system of almost any country will be more favourable for mental operations in arithmetic than is our present system. I again ask you whether you can lay before this Commission any decimal system in which the coins of our system are represented numerically in a form more easily to be added up in the mind than they are under our present system?—Although it might be well, if we adopted any decimal system, to alter to some extent the coins at present current in this country, still I believe when we are laying down a system to last throughout all ages, we ought to adopt the very best system we can lay our hands on; a little trouble which there might be perhaps in altering coins, or withdrawing them from circulation within the next five, ten, or twenty years, should not prevent us from adopting the best system, one that would confer infinite benefits on mankind in perpetuity.

774. My question referred, not to the inconvenience attending a period of change, but to the comparative convenience for mental operations of a permanent character of the two systems?—I can only say that in France, when I have been there, I found it infinitely more simple to add up sums in francs and centimes, withdrawing my attention entirely from their value in English money, incomparably more easy under the French decimal system than under our system. It is a mere question of experience. There are certain sums that you may pick out that it would be very difficult to express. I should

imagine that it would be utterly impossible to pay in our coins the value of three quarters of a pound of meat at 9½*d*. Our present coinage could not give that value, and that constantly occurs.

775. Under a decimal system of coinage would not this inconvenience necessarily arise that you could not state the price of a third part, of a sixth part, of a twelfth part, or of a sixteenth part of any commodity?—I might say, that under the present system you could not calculate the fifth part.

776. Do you consider that in the practical transactions of the market, fifth parts are as much required, or are as convenient for the retail transactions of the lower classes, as the divisions successively by two, by continual halving, or the divisions by three or by six?—There are hundreds of cases in which one system will give advantages in one way, and another system will give advantages in another way; that is, I believe, unquestionable. At the same time, on the whole, I think the balance of advantages greatly preponderates in favour of any decimal system over our present system.

777. Do you not consider that the first requisite of a good system of coinage is to give the subdivisions of the integer in the greatest possible number of clean fractional parts?—It would be, provided our system of numbers corresponded with that system; our present system of numbers is decimal. In case they corresponded with any given system, then, I think, that system would be the very best. If we had a duodecimal system of numbers, and the digits were 11, I think that the very best system of coins you could adopt would be the duodecimal system. That system of coins is the best that corresponds with our system of numbers. Now our system of numbers is decimal, therefore all the divisions of our money in my opinion should be decimal.

778. My question had no reference to any particular system of arithmetic, or of numbers, but simply to the practical form; whether or not the primary requisite in a good system of coinage is not that the integer should be broken into the greatest number of clean fractional parts, and those parts represented by corresponding coinage?—In my opinion the primary requisite in a good system of coinage is, that it should correspond with our system of numerical notation. We have 1, 2, 3, 4, 5, 6, 7, 8, 9. If it went on to 10 and 11, and we had 11 digits, then I believe that the duodecimal would be the best system. If we had only 7 digits, then I believe octaval would be the best system. But as our system of numbers is decimal, I believe that the divisions of weights and measures and coins should clearly be decimal.

779. Are not coins made for the purpose of facilitating the adjustment of the retail transactions in the market?—They are.

780. Is it not necessary for the greatest convenience of the retail transactions of the market that there should be a facility in dividing the commodities into the greatest number of clean fractional parts?—Unquestionably there would be very great advantage in that.

781. Does not it follow, necessarily, that the great desideratum in a good system of coinage is, that the coins should similarly be divisible into the greatest number of clean fractional parts of the integer?—Provided they correspond with our system of numbers. I believe that is a capital thing. Everything must turn upon it; whatever be the system of numbers the coinage must follow it.

782. Then do you consider that it is necessary that the division of commodities, and therefore the division of coins, should all bend to a decimal system of numbers?—I think so.

783. Then, in that case, I presume it is your opinion that the system of weights and measures should be formed upon a decimal scale?—I think so.

784. But you still hold that it is desirable that the system of coins should be decimalized, although the system of weights and measures be not decimalized?—I have no doubt that in the long run we shall obtain a decimal system of money, weights, and measures, and that decimal coins would be a step in the right direction; but, bating that, I think, on the bare ground of convenience and of facility in calculation, that a decimal system of monies would greatly facilitate calculations.

785. Of course you are aware that the number of divisors of 10 is much fewer than the number of divisors of 12?—Yes.

786. Therefore, it follows, does it not, that the decimal system cannot give the same number of clean fractional parts, whether applied to the division of commodities or applied to the division of coins, which a duodecimal or binary system would give?—I think it would give a fewer number of parts into which it could be divided, that is beyond all question.

787. Then is not that finally conclusive against the superiority of a decimal system over a duodecimal system, whether applied to weights and measures or to coins?—I think not.

788. Why do you think it is not, if you admit that it would give a much fewer number of clean fractional parts than the duodecimal system?—When you are dealing with these matters you must deal with them as a whole. Look first to see what is the basis of your system of numbers, and then I think the clearest principles must lead you to make your system of monies, weights, and measures on that basis,—on the same basis on which your system of numbers is founded. The system of notation is the basis of all our monies, weights, and measures; we must number and count by it. That is the thing which

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should determine our system of measures, weights, and monies. If we are going to adopt a new system of numbers, and we adopt a duodecimal system instead of a decimal system, then I concur with your Lordship.

789. Under our present system of numbers, and under our present system of coins, weights, and measures, is it not a fact that we divide the pound into twelve, and into sixteen ounces, that we divide the foot into twelve inches, and that we divide the shilling into twelve pence; and does it not necessarily follow, from what you have admitted already, that under that system of division we get a capacity and power of obtaining a greater number of clean fractional parts than we can obtain if we divide the foot, the pound, and the shilling into ten decimal parts?—But we sacrifice, in point of simplicity, if we gain in point of power of dividing into a greater number of parts.

790. Then you think that the abstract numerical simplicity is of greater value than the practical convenience of greater subdivision?—I believe that under a decimal system of notation, as we have it, the practical advantages resulting from a decimal system of coinage would very much exceed those resulting merely from the facility of dividing into a greater number of parts.

791. Can you show practically how that will arise?—From my own practical experience. In France I found much greater facility; and in the same way, when I was at school, at arithmetic, I found that decimals were very simple indeed as compared with compound arithmetic.

792. (*Chairman.*) A question has been put to you with reference to a foot being divisible into twelve inches, and the convenience of that foot being divisible into a greater number of equal parts than ten; are you aware that for a variety of important measurements public convenience has induced the use of a foot divisible into ten parts rather than into twelve?—I believe all our great engineers use it divided into ten parts; that in all the scales laid down for railways all the sections are laid down in tenths of a foot and in hundredths. All levelling is made exclusively on this division of the foot.

793. Is not the difference clearly marked in this way, that the division into ten parts is invariably resorted to where you want to make abstract calculations, and the division into twelve parts is retained where you have to deal with material subdivision?—I think it is seldom divided into twelve, except when you come into contact with the great bulk of the people; in that case engineers sometimes adopt the division into twelve, but among themselves I believe they universally adopt the tenths.

794. If there be an advantage in the division of commodities by the application of a system of numbers that is capable of a greater number of divisions, do you think the same principle would apply where the objects of the market are obtained by multiplication rather than by division?—I think when you come to multiplication the facilities afforded by the decimal system are very much greater. When you use multiplication instead of division I think the facilities afforded by the decimal system are incontestable.

795. Do you think that the operations in the markets generally depend more upon division or upon multiplication?—I think in all the largest retail transactions they depend more upon multiplication; perhaps in smaller transactions on division.

796. (*Lord Overstone.*) Is it not the very nature and purpose of coins to deal with subdivision? Are not coins the subdivision of the integer of account into its fractional parts, and have they not therefore exclusive reference to questions of division, and not of multiplication?—Whether multiplication or division comes into operation in retail transactions entirely depends upon what is the integer quantity (if I may use that expression) adopted in those transactions. Now if in the sale of tea to the lower classes the integer weight adopted be the ounce, and most purchasers are in quantities above an ounce, it is obvious that in the retail of tea multiplication comes into more frequent operation than division. The same rule holds in regard to coins when the price of a commodity is always expressed in that denomination of coin or its multiples which measures one integer quantity; thus sugar is said to be 6*d.*, not half a shilling, per pound; but, in my opinion, if we had a system of decimal coinage whose lowest denomination was as low as the lowest ever used in retail transactions, and had at the same time a decimal system of weights and measures, division could rarely, if ever, enter into the calculations involved in retail transactions, and even if it did, the fractions would all have a common denominator, 10, which would itself immensely facilitate calculation even in the most uneducated mind; but I am decidedly of opinion that in retail transactions practically division would be almost dispensed with under a decimal system of measures, weights, and coins, and that the great bulk of retail transactions would involve multiplication exclusively, and multiplication of the most simple kind; viz., in the first place, no multiplier would rise above nine, and in the second place, no multiplicand would be compound. Just take an instance; suppose under the French system the price of sugar were 1·90 francs per kilogramme; now if a customer wanted three hectogrammes, he would see at a glance that a hectogramme would be ·19 centimes, which he would multiply by three and get ·57 centimes.

797. (*Chairman.*) Have you turned your attention to any particular mode of division of coins that you would prefer to the pound and mil scheme, to which you have stated your objection?—In answer to that question, with the permission of the Commissioners, I beg to hand in this paper.

The following Table was handed in:— *Mr. T. C. Mossom Meekins.*

7th February 1857.

A TABLE showing how ENGLISH COINAGE can be adapted to the UNITED STATES DECIMAL SYSTEM of DOLLARS and CENTS, in case that Country would lower its $5 piece by 6·6 pence.

Sovereign contains 113·001 grains of fine gold, worth	- -	20*s.* sterling.
Half Eagle ($5) „ 116·100 „	„ - -	20*s.* 6·6 „
Sovereign would circulate at	- - -	$5·00
Half Sovereign	- - - - - -	2·50
Crown	- - - - - -	1·25
Dollar	- - - - - -	1·00
Half-Crown	- - - - - -	0·62½
Florin (or Half Dollar)	- - - - -	0·50
Shilling (or Quarter Dollar)	- - - -	0·25
Sixpence	- - - - - -	0·12½
Fourpence	- - - - -	0·08⅓
Threepence	- - - - - -	0·06¼
Penny	- - - - - -	0·02
Halfpenny	- - - - - -	0·01
Farthing	- - - - - -	0·00½

The copper coinage is here lowered in denomination four per cent.

The coins which, under this system, it would be requisite to withdraw from circulation are the same as those suggested to be withdrawn by the pound and mill advocates; viz., the fourpenny and threepenny pieces, and perhaps the half-crown, and coin $0·1 = 5*d.*, and $0·05 = 2½*d.* I would add, that our sovereign and the half eagle of the Americans differ only from each other by 6½*d.*, and that the Americans having three times altered the value of their half eagle within the last seventy years, it is not improbable that they might bring it into exact accordance with our coinage by going a step further, and lowering it 6½*d.*

798. You do not suggest that any alteration should be made in our own gold coinage?—None whatever. I think it necessary to keep a gold standard, as the Americans have recently practically adopted a gold standard.

799. (*Mr. Hubbard.*) In a paragraph, at Article 30 of your pamphlet, which was laid before the Commissioners, you state:—"The progress of the empire in wealth and "material well-being, when regarded in relation to currency, seems to take two opposite "and apparently inconsistent directions,—monetary transactions so vast and unexampled in amount would appear to demand a higher integer, and, therefore, if any "change be made," (that is in the currency of this country) "the pound should be rather "raised than lowered in value. On the hand, the great and increasing cheapness "resulting from the unparallelled progress of manufacturing industry seemingly demands "the adoption of a unit considerably lower than the pound, adequately to secure to the "people the benefits of this cheapness; thus, at the wholesale prices a ¼*d.* would "purchase 14 pearl shirt buttons, or 5 yards of tape, or 1½ reels of sewing cotton, or "2½ sewing cotton balls, or 27 needles, or 40 pins." If you contemplate any change in the value of the pound it will be of very little use asking the Americans to meet us at the present time?—I would only propose to alter the subdivision and multiples of the pound, not the value of it. I said, what is in the pamphlet, with reference to the adoption of the French system of francs and centimes to meet the objections of persons who said that the franc was too low. I propose that we should restore the pound to its former value, and make it 4*l.*, and then we would divide the old English pound into 100 francs, and the francs into 100 centimes.

800. What do you mean by restoring the pound to its former value? Originally it was four times its present value, as will be seen in page 15, the next paragraph:—"The pound sterling, as everybody knows, is now only one fourth of its former "value (*v.* Smith's 'Wealth of Nations,' by McCulloch, p. 484): by adopting the old "pound sterling, that is, making it equal to 4 sovereigns, and at the same time "introducing the franc and cents of the metrical system, we should secure such a system "as would satisfy the demands of progress. The old pound sterling would then contain "100 francs (or we might, as the 'Times' suggests, call them shillings), the franc 100 "cents. Francs might be indicated by the decimal dot as in France, thus, 624·86, "and the old pound sterling by the double dot, thus, 6:24·86; this would, as Professor De Morgan wishes, keep us in, or rather restore us to, connection with our "history. We could readily coin a piece of gold equal in value to our old pound, and "equivalent to the French coin of 100 francs. 1 old English pound sterling = 100 "francs = 10,000 cents."

801. (*Lord Overstone.*) If you had a pound sterling of four times its present value for your highest integer, what would be your lowest number of account?—A centime.

802. Do you propose to take 100 steps between the £4 and the centime?—No; 10,000. I said before at paragraph 7:—"The pound and mil and Mr. Headlam's farthing "schemes differ essentially from every decimal system adopted in any country: the

Mr. T. C. Mossom Meekins.

7th February 1857.

" integer has never hitherto been divided into more than 100 parts,—the dollar has 100 " cents, the franc 100 centimes; the intermediate step, the *dime* and *decime*, are never " used, if they are not utterly unknown to the working classes of the United States and " of France. There are practically but two denominations. But in these schemes the " integer is to have 1,000 mils. There are obvious reasons against this rejection of what " experience has recommended. Will not mental calculations be hopelessly embarrassed " when sums rise above 100 mils? Can the mind grasp several quantities bordering on " 1,000? Under this system the difficulties that impede mental calculation must be " enhanced ninefold. But, it is said, there will be three denominations,—pounds, florins, " and mils; if so, to make the systems scientifically symmetrical, and we will add " practically useful, they should be separated by equal steps or breaks; each ought to " contain 100 of the denomination immediately below it,—then it would be, mils, florins, " and ——? of the value of 10*l.*; this would 'crack the coinage' at both 'ends.'" If we divide our integer into more than 100 parts, we should go a step further and divide it into 10,000 parts, because the breaks should be separated by equal steps; that is to say, we should have 100 centimes in a franc, and 100 france in the old English pound.

803. How would you write that down? Have you ever drawn out a table representing the amounts of our present coinage in your proposed system of coinage?—Yes. I will put in a table showing that. This is one with regard to the French system, which I will hand in with your Lordships' permission.

The following Table was handed in:—

A Table showing how English Coins could circulate under the French System of Francs and Centimes.

Sovereign	contains 113·001 grains of fine gold,	worth 20*s.* sterling.	
Twenty-five francs	„ 112·009	„	„ 19*s.* 0·822 „

	Francs and Centimes.
Sovereign would circulate as	25·00
Half-sovereign	12·50
Crown (60*d.*)	6·00
Half-crown (30*d.*)	3·00
Shilling (12*d.*)	1·20
Sixpence (6*d.*)	0·60
Fourpence	0·40
Threepence	0·30
Penny (decime)	0·10
Halfpenny	0·05
Farthing	0·02½
Half-farthing	0·01¼

Thus by lowering the denomination of our token coinage four per cent. all our present coins could circulate under the French system at their present number of pence. The only new coins that would be required would be the franc and centime. A half-farthing might be called a centime, and the farthing a double centime. Under the French system, if we lowered all our silver and copper coinages 4 per cent., every single coin would circulate at its present number of pence. There would be 25 francs in the pound.

804. If I understand you correctly, you think it is very desirable to introduce a decimal system of notation in this country, on account of its convenience in account keeping and calculation?—Yes.

805. If all our present sums of money were written in the number of pence they contain, how would that depart or deviate from the decimal system you wish for?—I think you could have a decimal system out of that.

806. Would not that be the simplest form of obtaining your object, as it would not necessitate an alteration in the value, or in the name, or in the use of any one coin that we now have?—It would be very simple, but I should like to adopt the French or the American system.

807. If the simple process of writing down all our sums of money, not in pounds, shillings, and pence, but in pence only, would give the same facility of calculation that a decimal system would give, can you explain to me why it is that that process is never resorted to?—One reason would be, I think, that if you adopted that system you would require to have an integer say of either 10*d.* or 100*d.*, because we cannot imagine that the French could ever say they had 1,734 centimes, it would be much easier to say 17 francs and 34 centimes; but I can conceive that if you had merely one denomination, that is to say, pence, it would make it very much more complex; you would require to have the integer separated from your lowest denomination by at least 100. I think that all decimal systems hitherto adopted have shown that.

808. Comparing our present system with that system, and with the pound and mil system, the pound is now represented by the figure 1. Under that system it would be represented by the figures 240; under the pound and mil system by 1,000. Is there any respect in which that system would involve difficulties which are not equally involved in

the pound and mil system?—I do not think that under a proper decimal system the pound would be represented by 1,000. I think the decimal dot must in all cases determine the value. I think it is utterly impossible that we could think of adopting a decimal system in which the decimal dot did not determine the value.

809. Does not a decimal system really mean this, merely writing down in ordinary Arabic notation the number of a money account of the lowest value that is contained in any given sum?—No, I think not. The best systems require something more.

810. Will you state any decimal system in which that is not the case?—For instance, whenever in the American system they put down 5 dollars, they put down "5," not 5·00; and in France, whenever they put down 5 francs, they put down "5," and not 5·00; and when they want to put down 87 centimes, they put a dot, and 87 after it, thus, ·87.

811. That is merely omitting the cipher?—But it saves two figures using the decimal dot, which is a great thing. I wish to say, that I do not think it is very essential to keep the sovereign intact, for the value of gold in this country varies every hour. I think in any decimal system that we may adopt it is not very desirable, and it is not of primary necessity to keep the sovereign intact. I think that a decimal system would afford infinite facilities to commerce, and would greatly facilitate the operations of foreign merchants. I think also that it would effect an incredible saving of valuable time and labour. It has been found that even in great commercial houses few clerks are to be found who are able to audit and correct accounts that come from countries where the decimal system has not been introduced, whereas almost any clerks can audit and correct accounts which come from foreign countries in which the decimal system is adopted.

812. Have you made any estimate of the number of figures that would be required in rendering a calculation of account under our present system of coinage, and under any proposed system of decimal coinage that you would recommend?—I have seen calculations of that description, but I cannot say that I have personally made such; I do not doubt the correctness of those that I have seen.

813. Are you aware that a commercial account, rendered under the pound and mil system of notation, would involve 10 per cent. more figures than under our present system?—I cannot speak from my own knowledge, but its advocates strenuously assert not.

814. You have not examined into that part of the question?—I have seen calculations on the subject, but I have not gone through them myself. I would add, that it is my opinion that a decimal system would singularly simplify the study of comparative statistics, it would also incredibly facilitate the generalization of mental assimilation, and many schoolmasters say that it would shorten the period of education by at least two years. Most political economists are in favour of it.

The witness withdrew.

Adjourned.

APPENDIX.

No. 1.
Table of Schemes.

No. 1.

SYNOPTICAL TABLE of the several Schemes proposed for a DECIMAL COINAGE, which are based on the PRESENT COINAGE.

Designation of Scheme from its simplest Relation to the present Coinage.	Value in present Money of the principal Decimal Coins.				Proportion of lowest Unit.	Proportion of highest Unit to £ sterling.
	Lowest Unit.	Second Unit.	Third Unit.	Fourth Unit.		
	d.	*s.* *d.*	*s.* *d.*	£ *s.* *d.*	to Farthing.	
1. Pound and mil -	0·24	0 2·4	2 0	1 0 0	$\frac{24}{25}$	1
2. Farthing - -	0·25	0 2·5	2 1	1 0 10	1	$\frac{25}{24}$
3. Halfcrown -	0·3	0 3	2 6	1 5 0	$\frac{6}{5}$	$\frac{5}{4}$
					to Halfpenny.	
4. Four-shilling -	0·48	0 4·8	4 0		$\frac{24}{25}$	$\frac{1}{5}$
5. Halfpenny -	0·5	0 5	4 2		1	$\frac{5}{24}$
6. Crown - -	0·6	0 6	5 0		$\frac{6}{5}$	$\frac{1}{4}$
					to Penny.	
7. Eight-shilling -	0·96	0 9·6	8 0		$\frac{24}{25}$	$\frac{2}{5}$
8. Penny - -	1	0 10	8 4		1	$\frac{5}{12}$
9. Ten-shilling -	1·2	1 0	10 0		$\frac{6}{5}$	$\frac{1}{2}$
10. Twenty-penny -	0·2	0 2	1 8		$\frac{1}{5}$	$\frac{1}{12}$
					to Farthing.	
11. Guinea - -	0·252	0 2·52	2 1·2	1 1 0	$\frac{1008}{1000}$	$\frac{21}{20}$

Advocates of the several schemes:—

1. "Mercator," in the *Pamphleteer*, July 1814. Professor Cruickshank, Marischal College, Aberdeen, M.S. letter to the Chancellor of the Exchequer, 1817. Sir John Wrottesley, M.P. 1824. Colonel (now Lieut. General Sir C. W.) Pasley 1831. Babbage 1832. De Morgan. Decimal Association. Commissioners of Weights and Measures 1841 and 1854. Committee of House of Commons 1853, &c. &c. &c.

2. John Watt 1837. T. E. Headlam, M. P. J. W. C., *Times*, 14 Sept. 1853. A. Davidson. C. Vining. J. Alexander. T. C. Harington. *J. Crane. H. Aston.

3. S. S. Tayler, *Inquirer Newspaper*, 8th Sept. 1855.

4. "The British Metre," *Pamphleteer* 1816. E. B. Irwell, *Liverpool Mercury*, 2d March 1855.

5. "Subscriber in British Guiana," *Economist*, 25th August 1855. *Daily Telegraph*, 4th Oct. 1855. W. Shirreffs, *Spectator*, 27th Oct. 1855. *P. Blackburn, M.P.

6. Mentioned by J. D. in *Times* of 2d Sept. 1853. S. A. Goddard, *Birmingham Journal*, May 1855. *W. Mann.

7. A. Munro. *R. R. Tighe.

8. Dr. Gray, *Times*, 22d August 1853. T. W. Rathbone, *Athenæum*, 3d Sept. 1853. F. J. Minasi. J. H. Turner. J. Laurie. R. Slater.

9. Mentioned by Decimus Maslen (1841), p. 41. E. Ryley. W. T. Thomson. Rev. H. A. Goodwin. "A Retired Merchant," 1854. Author of *Remarks on a Decimal System of Accounts*, Glasgow. *E. Major.

10. G. H. in *Morning Advertiser*, 13th March 1855. S. A. Good.

11. Henry Goodwyn 1816. J. S. Holland, *Journal of Society of Arts*, 7th Sept. 1855.

* MS.

No. 1. Table of Schemes.

TABLE of the Value of the Present Current Coins, and of the Ounce of Standard Gold expressed in terms of the lowest Unit of the several proposed Decimal Schemes which are based on the present Coinage.

Designation of Scheme.	Farthing.	Halfpenny.	Penny.	Threepence.	Fourpence.	Sixpence.	Shilling.	Florin.	Halfcrown.	Crown.	Half-sovereign.	Sovereign.	Ounce of Standard Gold.
Penny - -	$\frac{1}{4}$	$\frac{1}{2}$	1	3	4	6	12	24	30	60	120	240	934·5
Halfpenny -	$\frac{1}{2}$	1	2	6	8	12	24	48	60	120	240	480	1869
Farthing -	1	2	4	12	16	24	48	96	120	240	480	960	3738
Ten-shilling -	$\frac{5}{24}$	$\frac{5}{12}$	$\frac{5}{6}$	$2\frac{1}{2}$	$3\frac{1}{3}$	5	10	20	25	50	100	200	778·75
Crown - -	$\frac{5}{12}$	$\frac{5}{6}$	$1\frac{2}{3}$	5	$6\frac{2}{3}$	10	20	40	50	100	200	400	1557·5
Halfcrown -	$\frac{5}{6}$	$1\frac{1}{3}$	$3\frac{1}{3}$	10	$13\frac{1}{3}$	20	40	80	100	200	400	800	3115
Eight-shilling	$\frac{25}{96}$	$\frac{25}{48}$	$1\frac{1}{24}$	$3\frac{1}{8}$	$4\frac{1}{6}$	$6\frac{1}{4}$	$12\frac{1}{2}$	25	$31\frac{1}{4}$	$62\frac{1}{2}$	125	250	973·4325
Four-shilling	$\frac{25}{48}$	$1\frac{1}{24}$	$2\frac{1}{12}$	$6\frac{1}{4}$	$8\frac{1}{3}$	$12\frac{1}{2}$	25	50	$62\frac{1}{2}$	125	250	500	1946·875
Pound and mil	$1\frac{1}{24}$	$2\frac{1}{12}$	$4\frac{1}{6}$	$12\frac{1}{2}$	$16\frac{4}{6}$	25	50	100	125	250	500	1,000	3893·75
Twenty-penny	$1\frac{1}{4}$	$2\frac{1}{3}$	5	15	20	30	60	120	150	300	600	1,200	4672·5
Guinea -	$1\frac{25}{126}$	$1\frac{62}{63}$	$3\frac{61}{63}$	$11\frac{19}{21}$	$15\frac{55}{63}$	$23\frac{17}{21}$	$47\frac{13}{21}$	$95\frac{5}{21}$	$119\frac{1}{21}$	$238\frac{2}{21}$	$476\frac{4}{21}$	$952\frac{8}{21}$	3708·33
Present system	$\frac{1}{4}d.$	$\frac{1}{2}d.$	1*d.*	3*d.*	4*d.*	6*d.*	1*s.*	2*s.*	2*s.* 6*d.*	5*s.*	10*s.*	1*l.*	£3 17 $10\frac{1}{2}$

Note.—A scheme of Decimal Coinage is *given* when the value in our present coinage of any one of its units, i.e., of any one of the coins in the decimal series is *given*, and it may be distinguished and designated by that value. Thus scheme No. 1 is given, when either the pound or the florin is given as one of its units, and it might be called indifferently the pound scheme or the florin scheme. So No. 3 might be called the halfcrown scheme or the threepenny scheme; No. 8, the penny scheme or the tenpenny scheme.

The names given to some of the schemes in the table differ from the names given them by their proposers; and some schemes, treated in the table as one, are distinguished as different schemes by their advocates, according to their views of what should be the highest and what should be the lowest unit.

Thus, some advocates of No. 1 make the florin the highest unit, dividing it into 100 parts. Some advocates of No. 8 make the tenpenny the highest unit, and the tenth of a penny the lowest unit; while others make 8*s.* 4*d.* the highest unit, and one penny the lowest unit, dividing it into halves and quarters, as at present. These variations will readily suggest themselves on an inspection of the table.

A. S.

No. 2.

No. 2. Comparative Table of Coins.

COMPARATIVE TABLE of the PRESENT COINS of the UNITED KINGDOM and of the DECIMAL COINS proposed by the Committee of the House of Commons in 1853 (retaining the half-crown and adding a four-mil piece).

Present Coins.		Value in MILS of PRESENT COINS which have no corresponding Decimal Coins.	Value in £ *s.* *d.* of PRESENT COINS.	Value in Mils of proposed DECIMAL COINS.	Value in PENCE of DECIMAL COINS which have no corresponding Present Coins.	Decimal Coins.	
Fractions of next higher Coin.	Fractions of Pound Sterling.					Fractions of Pound Sterling.	Fractions of next higher Coin.
			£ *s.* *d.*	£ Mils.			
			1 0 0	1,000			
$\frac{1}{2}$	$\frac{1}{2}$		0 10 0	500		$\frac{1}{2}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{4}$		0 5 0	250		$\frac{1}{4}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{8}$		0 2 6	125		$\frac{1}{8}$	$\frac{1}{2}$
$\frac{4}{5}$	$\frac{1}{10}$		0 2 0	100		$\frac{1}{10}$	$\frac{4}{5}$
$\frac{1}{2}$	$\frac{1}{20}$		0 1 0	50		$\frac{1}{20}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{40}$		0 0 6	25		$\frac{1}{40}$	$\frac{1}{2}$
				20	$4\frac{4}{5}d.$	$\frac{1}{50}$	$\frac{4}{5}$
$\frac{2}{3}$	$\frac{1}{60}$	$16\frac{4}{6}$	0 0 4				
$\frac{3}{4}$	$\frac{1}{80}$	$12\frac{1}{2}$	0 0 3				
				10	$2\frac{2}{5}d.$	$\frac{1}{100}$	$\frac{1}{2}$
				5	$1\frac{1}{5}d.$	$\frac{1}{200}$	$\frac{1}{2}$
$\frac{1}{3}$	$\frac{1}{240}$	$4\frac{1}{6}$	0 0 1				
				4	0·96*d.*	$\frac{1}{250}$	$\frac{4}{5}$
$\frac{1}{2}$	$\frac{1}{480}$	$2\frac{1}{12}$	0 0 $0\frac{1}{2}$				
				2	0·48*d.*	$\frac{1}{500}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{960}$	$1\frac{1}{24}$	0 0 $0\frac{1}{4}$				
				1	0·24*d.*	$\frac{1}{1000}$	$\frac{1}{2}$

No. 3.
Mr. Chisholm's Memorandum.

No. 3.

MEMORANDUM by HENRY WILLIAMS CHISHOLM, Esq., Senior Clerk of Exchequer Bill Office. Dated Feb. 1, 1856.

Conversion of Old into New Coins.

DURING the transition from the old to the new system, it will be continually necessary to convert the fractional parts of a pound, viz.: *shillings, pence, and farthings,* into *florins, cents and mils,* or rather into *florins and mils* for the sake of preserving the present method of keeping accounts in three columns only.

In the case of one amount, the process is simple, and is thus described by Mr. De Morgan (*Com. to Brit. Alm.* 1854, *p.* 7.):—"To transfer old silver into new, throw into mils at once, "as follows: *Allow* 100 *for every florin, or pair of shillings,* 50 *for the odd shilling, if any,* "*and one mil for every farthing left, with one mil more for sixpence.* Thus 7*s.* 10¼*d.* is 300 "and 50 and 41 and 1 mils, or 392 mils, that is three florins, nine cents., and two mils."

He proceeds to show, that although these reductions are not exact for any sum under sixpence, nor can be made exact without introducing fractions of a mil, yet that the error never amounts to a mil. In fact, that so many farthings as there are in excess above the last sixpence, so many 24ths of a mil are wanting in the new money.

He argues that this error is quite immaterial in ordinary transactions, and that "although "fractions of a farthing or a mil will be talked about whilst the change is pending, they will "subside into their old insignificance before the new coins have circulated for a week."

These conclusions appear reasonable. But it will be seen that Mr. De Morgan allows nothing for any fractional parts of a mil, even when they amount to $\frac{23}{24}$. This method has the merit of simplifying and facilitating calculations. But it is hardly just, particularly when many amounts have to be converted and their sum to be taken.

It would be fairer to make the conversion on the principle acted on in the 6 Geo. 4. c. 79. for assimilating the Irish with the British currency. This Statute, which commenced on 5th January 1826, also affords a precedent for some provisions that may be expedient upon the adoption of a Decimal Coinage.

Previously to the passing of this Act, Irish money passed for one thirteenth less than the same nominal amount of British money, and thirteen Irish pence were equivalent to twelve British pence. Consequently, in the conversion of Irish monies into British, certain fractional parts of a penny would frequently arise; 1*d.* Irish would be equivalent only to $\frac{12}{13}$ or $\frac{48}{52}$ of 1*d.* British, and 10¼*d.* Irish to $9\frac{6}{13}d.$ or $9\frac{24}{52}d.$ British.

In order to obviate uncertainty in all monies so converted, section 5. of the Act provided,—

That no account should be taken of $\frac{4}{52}$ of 1*d.*

That $\frac{8}{52}$, $\frac{12}{52}$, and $\frac{16}{52}$ should = ¼*d.*
$\frac{20}{52}$, $\frac{24}{52}$, $\frac{28}{52}$, and $\frac{32}{52}$,, = ½*d.*
$\frac{36}{52}$, $\frac{40}{52}$, $\frac{44}{52}$,, = ¾*d.*
And $\frac{48}{52}$,, = 1*d.*

Here, when the fraction amounted to half a farthing, it was reckoned as a farthing, and a lesser fraction was not taken into account.

Table A. Upon this principle, Table A. has been constructed, showing the equivalents in mils of each fraction of the old monies from ¼*d.* to 6*d.* It should be borne in mind, that in converting farthings into mils, for every farthing so converted, $\frac{1}{24}$ of a mil is wanting in the new monies; in other words, that a farthing is equivalent to a mil and $\frac{1}{24}$ of a mil. The Table shows also the exact equivalent, both in fractions and in decimals of a mil.

Mr. De Morgan's rule may therefore be thus amended:—

"To transfer old silver into new, throw it into mils at once, as follows: Allow 100 for "every florin or pair of shillings, 50 for the odd shilling, if any, 25 for the odd sixpence, if "any, and one mil for every farthing left, with one mil more for *three*pence. Thus 7*s.* 10¼*d.* "is 300 and 50 and 25 and 17 and 1 mils, or 393 mils, that is 3 florins, 9 cents. and 3 mils."

By this rule, the conversion may be made with sufficient exactness in all ordinary transactions, and even in accounts comprising a considerable number of amounts, so that the difference in the result will be quite insignificant.

Table B. A very little practice would enable the conversion to be made immediately by mere inspection. It might also be facilitated by the use of Table A. as well as by that of Table B. which shows the equivalent in mils of the several sums from 6*d.* to 19*s.* 6*d.*

For more accurate calculations, it will be necessary to take into account the smallest fraction of a mil. In these cases, the Decimal System may be used with advantage, and for this purpose the last column of Table A. may be seviceable.

The following is an example of a calculation of this kind:—

How much do 1,537 ounces of gold at 3*l.* 17*s.* 10½*d.* per ounce amount to?

By the above-mentioned rule, 17*s.* 10½*d.* = 800 + 50 + 25 + 18 + 1 mils, or 894 mils, but more correctly $893\frac{18}{24}$ mils, or 893·75.

£3·89,375
1,537
2,725,625
1,168,125
1,946,875
389,375

£	fl.	mils.	
£598,469,375	or 5,984	6 and 94.	Being 46 figures.

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Compare this with the present mode of calculation:

As 1 oz. : 1,537 oz. :: £3 17 10½

20

77
12

934
4

3,738
1,537

26,166
11,214
18,690
3,738

4) 5,745,306

12) 1,436,326½

20) 119,693 — 10½

£5,984 13 10½

Or 600 + 50 + 25 + 18·75
Or £5984·69375

Being 85 figures.

And the simplicity, facility, and less probability of error of calculations by the Decimal System are at once obvious.

Payment of Sums under 6d. with the New Monies.

In order to pay fractional sums under 6*d.* with monies of the new system, it will be necessary to construct a scale of the new monies up to 25 mils, with their equivalents in pence and farthings. A precedent for this will also be found in the Act 6 Geo. 4. c. 79. s. 13., which provides for the payment of sums under 12*d.* Irish in British currency. After reciting that it was unavoidable that in the payment of several of such sums, an inconsiderable loss of a part of a farthing must be incurred either by the debtor or the creditor, and it was necessary that some plain rule, not liable to be misunderstood, should be applied to ascertain upon which party such inconsiderable loss should fall, it was enacted that sums of ¼*d.*, ½*d.*, ¾*d.*, 1*d.*, 1¼*d.*, and 1½*d.*, Irish, should be paid by the same sums in British currency.

Sums exceeding 1½*d.* and not exceeding 4¾*d.* Irish, by payments in British currency, less by one farthing.

Sums exceeding 4¾*d.* and not exceeding 8*d.* Irish, by payments in British currency, less by one halfpenny.

Sums exceeding 8*d.* and not exceeding 11¼*d.* Irish, by payments in British currency, less by three farthings.

And sums exceeding 11¼*d.* and not exceeding 12*d.* Irish, by payments in British currency, less by one penny.

This section is the converse of the previous section 5, for changing Irish into British currency, and the scale is calculated on the same principle of reckoning the fraction when it amounts to half a farthing, as a farthing, and of not taking into account any less fraction. Thus, 1½*d.* British currency exceeds 1½*d.* Irish by $\frac{6}{13}$ of a farthing, and is, therefore, reckoned necessary for payment of 1½*d.* Irish, the $\frac{6}{13}$ of a farthing not being taken into account. But a 1½*d.* British currency is also at the same time sufficient to pay 1¾*d.* Irish, as it is within $\frac{6}{13}$ of a farthing of the latter sum, and the difference being less than half a farthing is not taken into account. So again, 4½*d.* British exceeds 4¾*d.* Irish by $\frac{6}{13}$ of a farthing, and is also within $\frac{6}{13}$ of a farthing of 5*d.* Irish. It is therefore applicable for the payment of both these sums.

Table C has been constructed from this precedent, showing a scale of mils, from 1 to 25, with their equivalents in pence and farthings, for legal payments. It shows also the the exact equivalents up to the fraction of farthing. It should be noticed that, although a farthing is equivalent to a mil and $\frac{1}{24}$ of a mil, yet that a mil is not equal to a farthing by $\frac{1}{25}$ of a farthing. In other words, a mil is equal to $\frac{24}{25}$ of a farthing, the difference between the two coins being $\frac{1}{25}$ of a farthing, or $\frac{1}{24}$ of a mil. Table C.

In table C will be found a similar unavoidable result to that of the 13th section of the Act of the 6 Geo. 4. Twelve mils will be sufficient for payment of a debt of 3*d.*, whilst 13 mils will pay no greater sum.

Dividends of Public Funds.

Other provisions were introduced in the Act 6 Geo. 4. c. 79, which may be noticed. For the purpose of facilitating the calculations of interest on the public funds in Ireland, it was

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provided by section 6, that all pence and fractions of a penny of principal should be paid to the proprietors when they next received their dividends, so that the capital sum remaining to each proprietor should be thereby made to consist of pounds and shillings only. Under section 7 these amounts, so paid and advanced by the Bank of Ireland, were directed to be repaid out of monies at the disposal of the Commissioners for the Reduction of the National Debt.

How far a similar provision in any legislative measure to establish a Decimal Coinage would be expedient at the present time, might be made the subject of inquiry at the Banks of England and Ireland. A statement might also be obtained from the latter as to the convenience or otherwise, to the Bank and the public, that resulted from the operation of this section in the Act of 1826.

It might also be inquired whether these banks would make payments of single mils in the case of dividends. At present they do not pay any fraction of a penny. Mr. T. Hankey, in his evidence before the Decimal Coinage Committee, states (125), that the aggregate variation between pence of dividends received and paid at the Bank of England is not above 300*l.* per annum.

Mr. Miller, one of the cashiers, states (1,138). that the number of stock accounts at the Bank amounts to upwards of 300,000, and calculations have to be made on each of these accounts every half year, for the payment of dividends. Supposing that by the practice of not paying fractions of a penny the Bank of England gained on an average one farthing upon every payment, this would amount to 625*l.* per annum, which must be nearly the exact sum, as it appears that the Bank has stated the gain in a recent quarter to be 187*l.*

Public Accounts.

To avoid as much as possible the introduction of the fractional parts of a penny into the public accounts, section 8 of the 6 Geo. 4. c. 79. provided, that in the case of any annual sum chargeable on the Consolidated Fund, and payable in Irish currency, such addition should be made to it, upon its conversion into British currency, as should be sufficient to exclude fractions of a penny, both from the annual sum and the several quarterly payments thereof.

It may be here stated that by section 19 of the Exchequer Act, 4 Will. 4. c. 15., all fractional parts of a penny are now excluded in all payments made and accounts kept under that Act.

In the absence of any special legislative provision, accounts would be kept, and payments made, in single mils, both with respect to public dividends, and the public revenue. It does not appear that any complexity or difficulty would result to the accounts, although far greater accuracy would be obtained. In the conversion from the old to the new system of two annnal balance sheets of the public income and expenditure of 1852 and 1855 respectively, the increase of the total number of figures from shillings and pence to florins and mils is about 8 per cent. only.

But it is probable that in by far the greater number of cases no payments would be made or accounts kept, of less than five mils. This practice would be found very convenient, and would afford much facility in business. It would be in conformity with the practice now established in all public accounts and payments, and in respect to these, might be specially provided for by legal sanction.

This last remark does not apply to payments in detail of revenue, duties, &c. These require a separate consideration. It would be desirable to inquire what is the present practice, in the several departments, as to fractional parts of a penny. For instance, in respect to the duty on eggs from British possessions, declared by the Customs Act, 8 & 9 Vict. c. 90. to be 2½*d.* per 120, and 5*l.* per cent. additional.

Unfunded Debt.—Exchequer Bonds

Appendix 2.

As to the unfunded debt, the interest of Exchequer Bonds being payable half-yearly by certificates annexed to the bonds, there would be no difficulty in the conversion of their amounts, as no fraction of sixpence is payable. This will be seen by the appended statement of Exchequer Bonds now outstanding, which shows also the amounts of half-yearly interest due on the several bonds.

Exchequer Bills.

The case is somewhat different as regards Exchequer Bills, interest on which is calculated by the day per cent. On the Supply Bills issued to the public the interest is usually paid as nearly as may be for one whole year, when the bills are exchanged, and the date of the exchange is fixed with the view to provide that, on the calculation of the number of days for which interest is to be paid, no fraction of a penny shall arise. Interest on Deficiency Bills, which are charged on the growing produce of the current quarter, is calculated to the day on which each bill is paid off, and the whole amount of interest is subsequently paid in one sum once a quarter, as is also the interest on Consolidated Fund Bills, which are charged on the growing produce of the next succeding quarter to that in which they are issued. Both Deficiency and Consolidated Fund Bills are taken by the Bank of England, and are not issued to the public.

Appendix 3.

An account appended shows the number and amount of Exchequer Bills of each description issued in the last three years, together with the rate of interest and the amount of interest actually paid on the Deficiency and Consolidated Fund Bills, and the date when

paid. The amount of interest actually paid on the Supply Bills is not specified, as several amounts of these bills were paid off at various periods in the course of the years 1853 and 1854, being cancelled for Sinking Fund and Savings Banks, or exchanged for Exchequer Bonds, &c., and interest on these amounts was paid only up to the several days on which they were so cancelled.

It will be seen from this account that during the three years the rate of interest has ranged from 1*d.* per cent. per diem, the lowest rate ever charged, to 2½*d.* The highest interest authorized by the Exchequer Bill Acts is 3½*d.* per diem, which was the rate actually borne by Exchequer Bills in the year 1815. In the following year the rate was reduced to 3¼*d.*, and in 1817 to 3*d.* and 2½*d.* per diem. Since 1817 Exchequer Bills have borne no higher rate of interest than 2½*d.*, with the single exception of the bills issued for exchange on 15th June 1847, to the amount of 9,138,400*l.*, which bore interest at the rate of 3*d.* per cent. per diem.

The establishment of the Decimal System would cause an alteration in the rate of interest on Exchequer Bills, from the authorized maximum of 3½*d* to that of 15 mils per cent. per diem. From a maximum of 1*d.* up to 2¾*d.* there would be a progressive difference, when converted into their legal equivalents in mils, from $\frac{4}{24}$ to $\frac{11}{24}$ of a mil respectively, in diminution of the rate per cent. per diem, whilst the higher rates of 3*d.* 3¼*d.* and 3½*d.* would show a progressive excess in their equivalents in mils of $\frac{12}{24}$, $\frac{11}{24}$, and $\frac{10}{24}$ of a mil respectively.

What would be the effect on the rate of interest on Exchequer Bills, supposing the change to the new system to be made immediately?

Now the present rate is 2½*d.* per cent. per diem, equivalent to 3*l.* 16*s.* per cent. per annum. The price in the market of Exchequer Bills is a little under par, although the 3*l.* per cent. consols are at 90, which gives an interest of 3*l.* 6*s.* 8*d.* only per cent. per annum.

But it is in fact the price in the market which regulates the rate of interest on Exchequer Bills, enabling the Chancellor of the Exchequer, on the occasion of issues, either for exchange or for current services, to reduce the rate on the new bills, or compelling him to increase it. If the conversion into the new monies therefore were to take place at the present time, it would be necessary to convert the 2½*d.* not into 10 mils according to the table of legal equivalents, the effect of which would be to lower the rate of interest $\frac{10}{24}$ of a mil per cent. per diem, or 3*s.* 2*d.* per annum, but into 11 mils, being an increase of $\frac{10}{24}$ of a mil per cent. per diem, or 4*s.* 5*d.* per annum. This increase might, perhaps, be sufficient to raise the bills to a premium in the market. The general result of the change to the new system would be to give a somewhat under range to the variation of the rate of interest on Exchequer Bills, as well as slightly to reduce the amount of each variation, supposing that it does not exceed one farthing, by $\frac{1}{24}$ of a mil. Even this small reduction would make a difference in the total annual interest on the present amount of Supply Exchequer Bills, (22,200,000*l.*) of 3,385*l.* 10*s.* which would be either saved or lost to the revenue, according as the interest was increased or reduced.

But it is in the calculations of interest on Exchequer Bills, as in all other calculations, *especially those which involve any rate per cent.* that the advantages of the Decimal System are to be found.

Take, for example, interest on the amount of 14,000*l.* Exchequer Bills, brought in for exchange, say on 9 March next, and dated 7 March, 1855, being up to and including 24 October, 1856, (231 days) at 2¼*d.* per diem, and from that day to 9 March 1856, (137 days at 2½*d.* per diem.)

By the old method the same would be as follows:—

£14,000 at 2¼*d.* per cent. per diem for 231 days.

2¼

280
35

315
231

315
945
630

12)72,765(

20)606,3—9

£303 3 9

And £14,000 at 2½*d.* per cent. per diem for 137 days.

2½

280
70

350
137

6850
411

12)47,950

20)399,5 10

199 15 10

Add 303 3 9

£502 19 7 being 106 figures.

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By the new system:—

£14,000 at 9 mils per cent. per diem for 231 days.

9				
1260				
231				
13860				
2772				
		£	fl.	mils.
291·060,	or	291	0	60

And £14,000 at 10 mils per cent. per diem for 137 days.

137				
54800				
137				
£191·800	or	191*l.*	8fl.	
Add 291·060				
£482·060	or	482*l.*	60	mils,
				being 62 figures.

To obtain the same result by both systems it will be necessary to add $\frac{9}{24}$ of a mil to the rate of 9 mils, and $\frac{10}{24}$ of a mil to the rate of 10 mils, thus :

£291·060

Add 14,000*l.* at $\frac{9}{24}$ mil per cent. per diem for 231 days = 12·1275

	£	s.	d.
£303·1875	or 303	3	9

And - £191 800

Add 14,000*l.* at $\frac{10}{24}$ mil per cent. per diem for 137 days = 7 9916

	£	s.	d.
£199·7916	or 199	15	10
£502·97916	or £502	19	7

This comparison of the several calculations also shows the advantage of the Decimal System. Instead of 106 figures 62 only are necessary; one process alone is used, that of multiplication, and no division is required.

It is true that in the event of any number of calculations of the amount of interest on Exchequer Bills, tables constructed for the purpose would be used; but in by far the greater number of cases, a separate calculation of each is made.

The following scale shows the amount per cent. per annum of each rate of interest from $\frac{1}{4}d.$ to $3\frac{1}{2}d.$ per cent. per diem, contrasted with similar rates from 1 to 15 mils.

Per cent. per diem. *d.*		Per cent. per annum. £	s.	d.
$\frac{1}{4}$	=	0	7	$7\frac{1}{4}$
$\frac{1}{2}$	=	0	15	$4\frac{1}{2}$
$\frac{3}{4}$	=	1	2	$11\frac{3}{4}$
1	=	1	10	5
$1\frac{1}{4}$	=	1	18	$0\frac{1}{4}$
$1\frac{1}{2}$	=	2	5	$7\frac{1}{2}$
$1\frac{3}{4}$	=	2	13	$2\frac{3}{4}$
2	=	3	0	10
$2\frac{1}{4}$	=	3	8	$5\frac{1}{4}$
$2\frac{1}{2}$	=	3	16	$0\frac{1}{2}$
$2\frac{3}{4}$	=	4	3	$7\frac{3}{4}$
3	=	4	11	3
$3\frac{1}{4}$	=	4	18	$10\frac{1}{4}$
$3\frac{1}{2}$	=	5	6	$5\frac{1}{2}$

Per cent. per diem. Mil.		Per cent. per annum. Mils.		£	fl.	mils.
1	=	365	or	0	3	65
2	=	730	or	0	7	30
3	=	1·095	or	1	0	95
4	=	1·460	or	1	4	60
5	=	1·825	or	1	8	25
6	=	2·190	or	2	1	90
7	=	2·555	or	2	5	55
8	=	2·920	or	2	9	20
9	=	3·285	or	3	2	85
10	=	3·650	or	3	6	50
11	=	4.015	or	4	0	15
12	=	4·380	or	4	3	80
13	=	4·745	or	4	7	45
14	=	5·110	or	5	1	10
15	=	5·475	or	5	4	75

The year is here taken as 365 days, which would be at all times found convenient, so as not to require a less payment of interest than 5 mils. In leap years this would advance the period of the exchange of Exchequer Bills one day only, and this in the course of four years; whilst by the present practice of taking 364 days, to avoid fractions of a penny, the March and June exchanges have been advanced to the first week of the month in the course of a few years only.

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Appendix I.

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Table A.

Showing the equivalents in mils of each fraction of the old monies from $\frac{1}{4}d.$ to 6*d.*

Pence.		Mils.		Mils and Fractions.		Mils and Decimals.	Pence.		Mils.		Mils and Fractions.		Mils and Decimals.
$\frac{1}{4}$	=	1	or	$1\frac{1}{24}$	or	1·0416...	$3\frac{1}{4}$	=	14	or	$13\frac{13}{24}$	or	13·5416...
$\frac{1}{2}$	=	2	or	$2\frac{2}{24}$	or	2·0833...	$3\frac{1}{2}$	=	15	or	$14\frac{14}{24}$	or	14·583...
$\frac{3}{4}$	=	3	or	$3\frac{3}{24}$	or	5·125	$3\frac{3}{4}$	=	16	or	$15\frac{15}{24}$	or	15·625
1	=	4	or	$4\frac{4}{24}$	or	4·166 ...	4	=	17	or	$16\frac{16}{24}$	or	16·66...
$1\frac{1}{4}$	=	5	or	$5\frac{5}{24}$	or	5·2083...	$4\frac{1}{4}$	=	18	or	$17\frac{17}{24}$	or	17·7083...
$1\frac{1}{2}$	=	6	or	$6\frac{6}{24}$	or	6·25	$4\frac{1}{2}$	=	19	or	$18\frac{18}{24}$	or	18·75
$1\frac{3}{4}$	=	7	or	$7\frac{7}{24}$	or	7·3916...	$4\frac{3}{4}$	=	20	or	$19\frac{19}{24}$	or	19·8916...
2	=	8	or	$8\frac{8}{24}$	or	8·33...	5	=	21	or	$20\frac{20}{24}$	or	20·833...
$2\frac{1}{4}$	=	9	or	$9\frac{9}{24}$	or	9·375	$5\frac{1}{4}$	=	22	or	$21\frac{21}{24}$	or	21·875
$2\frac{1}{2}$	=	10	or	$10\frac{10}{24}$	or	10·416...	$5\frac{1}{2}$	=	23	or	$22\frac{22}{24}$	or	22·916...
$2\frac{3}{4}$	=	11	or	$11\frac{11}{24}$	or	11·4583...	$5\frac{3}{4}$	=	24	or	$23\frac{23}{24}$	or	23·9583...
3	=	12	or	$12\frac{12}{24}$	or	12·5	6	=	26	or	$24\frac{24}{24}$	or	25·

Table B.

Equivalents in mils from 6*d.* to 19*s.* 6*d.*

s.	*d.*	mils.	*s.*	*d.*	mils.	*s.*	*d.*	mils.	*s.*	*d.*	mils.
0	6 =	25	5	6 =	275	10	6 =	525	15	6 =	775
1	0 =	50	6	0 =	300	11	0 =	550	16	0 =	800
1	6 =	75	6	6 =	325	11	6 =	575	16	6 =	825
2	0 =	100	7	0 =	350	12	0 =	600	17	0 =	850
2	6 =	125	7	6 =	375	12	6 =	625	17	6 =	875
3	0 =	150	8	0 =	400	13	0 =	650	18	0 =	900
3	6 =	175	8	6 =	425	13	6 =	675	18	6 =	925
4	0 =	200	9	0 =	450	14	0 =	700	19	0 =	950
4	6 =	225	9	6 =	475	14	6 =	725	19	6 =	975
5	0 =	250	10	0 =	500	15	0 =	750			

Table C.

Showing a Scale of mils from 1 to 25 mils, with their equivalents in pence and farthings for legal payments, together with their exact equivalents.

	For Legal Payment of	Exact Equivalents.	
Mils.	*d.*	*d.*	
1 =	$0\frac{1}{4}$	or $0\frac{1}{4}$	less $\frac{1}{25}$ of a farthing, or $\frac{24}{25}$ of a farthing.
2 =	$0\frac{1}{2}$	or $0\frac{1}{2}$	„ $\frac{2}{25}$ „ or $0\frac{1}{4}$ & $\frac{23}{25}$ „
3 =	$0\frac{3}{4}$	or $0\frac{3}{4}$	„ $\frac{3}{25}$ „ or $0\frac{1}{2}$ & $\frac{22}{25}$ „
4 =	1	or 1	„ $\frac{4}{25}$ „ or $0\frac{3}{4}$ & $\frac{21}{25}$ „
5 =	$1\frac{1}{4}$	or $1\frac{1}{4}$	„ $\frac{5}{25}$ „ or 1 & $\frac{20}{25}$ „
6 =	$1\frac{1}{2}$	or $1\frac{1}{2}$	„ $\frac{6}{25}$ „ or $1\frac{1}{4}$ & $\frac{19}{25}$ „
7 =	$1\frac{3}{4}$	or $1\frac{3}{4}$	„ $\frac{7}{25}$ „ or $1\frac{1}{2}$ & $\frac{18}{25}$ „
8 =	2	or 2	„ $\frac{8}{25}$ „ or $1\frac{3}{4}$ & $\frac{17}{25}$ „
9 =	$2\frac{1}{4}$	or $2\frac{1}{4}$	„ $\frac{9}{25}$ „ or 2 & $\frac{16}{25}$ „
10 =	$2\frac{1}{2}$	or $2\frac{1}{2}$	„ $\frac{10}{25}$ „ or $2\frac{1}{4}$ & $\frac{15}{25}$ „
11 =	$2\frac{3}{4}$	or $2\frac{3}{4}$	„ $\frac{11}{25}$ „ or $2\frac{1}{2}$ & $\frac{14}{25}$ „
12 =	3	or 3	„ $\frac{12}{25}$ „ or $2\frac{3}{4}$ & $\frac{13}{25}$ „
13 =	3	or $3\frac{1}{4}$	„ $\frac{13}{25}$ „ or 3 & $\frac{12}{25}$ „
14 =	$3\frac{1}{4}$	or $3\frac{1}{2}$	„ $\frac{14}{25}$ „ or $3\frac{1}{4}$ & $\frac{11}{24}$ „
15 =	$3\frac{1}{2}$	or $3\frac{3}{4}$	„ $\frac{15}{25}$ „ or $3\frac{1}{2}$ & $\frac{10}{25}$ „
16 =	$3\frac{3}{4}$	or 4	„ $\frac{16}{25}$ „ or $3\frac{3}{4}$ & $\frac{9}{25}$ „
17 =	4	or $4\frac{1}{4}$	„ $\frac{17}{25}$ „ or 4 & $\frac{8}{25}$ „
18 =	$4\frac{1}{4}$	or $4\frac{1}{2}$	„ $\frac{18}{25}$ „ or $4\frac{1}{4}$ & $\frac{7}{25}$ „
19 =	$4\frac{1}{2}$	or $4\frac{3}{4}$	„ $\frac{19}{25}$ „ or $4\frac{1}{2}$ & $\frac{6}{25}$ „
20 =	$4\frac{3}{4}$	or 5	„ $\frac{20}{25}$ „ or $4\frac{3}{4}$ & $\frac{5}{25}$ „
21 =	5	or $5\frac{1}{4}$	„ $\frac{21}{25}$ „ or 5 & $\frac{4}{25}$ „
22 =	$5\frac{1}{4}$	or $5\frac{1}{2}$	„ $\frac{22}{25}$ „ or $5\frac{1}{4}$ & $\frac{3}{25}$ „
23 =	$5\frac{1}{2}$	or $5\frac{3}{4}$	„ $\frac{23}{25}$ „ or $5\frac{1}{2}$ & $\frac{2}{25}$ „
24 =	$5\frac{3}{4}$	or 6	„ $\frac{24}{25}$ „ or $5\frac{3}{4}$ & $\frac{1}{25}$ „
25 =	6	or $6\frac{1}{4}$	„ $\frac{25}{25}$ „ or 6

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Appendix II.

An Account of Exchequer Bonds now outstanding, showing the Act under which they are issued, the Date when payable, the Number and Amount of each description, the Rate of Interest and Half-yearly Amount of Interest on each Bond, together with the total Amount of Principal, and Half-yearly Interest of such Exchequer Bonds.

Act.	When Payable.	Number of Bonds.	Amount of each Bond.	Rate of Interest per Cent. per Annum.	Amount of Half-yearly Interest on each Bond.	Total Amount of Principal.	Total Amount of Half-yearly Interest.
			£	£	£ s. d.	£	£ s. d.
16 Vict. c. 23. (1853) -	1st Sept. 1894	362	1,000	2¾ (to 1st Sept. 1864) -	13 15 0		
				2½ (from do. to 1st Sept. 1894)	12 10 0		
		74	500	2¾ - -	6 7 6		
				2½ - -	6 5 0		
		11	200	2¾ - -	2 15 0		
				2½ - -	2 10 0		
		171	100	2¾ - -	1 7 6		
				2½ - -	1 5 0	- - -	5,228 15 0
		618	—	—	—	418,300	5,751 12 6
17 Vict. c. 23. (1854) -	8th May 1858	900	1,000		17 10 0		
		1,060	500	3½ - -	8 15 0		
		1,500	200		3 10 0		
		1,700	100		1 15 0		
		6,160 A	—	—		2,000,000	35,000 0 0
	„ 1859 -	400	1,000				
		1,200	500				
		2,000	200	3½ - -	As above.		
		6,000	100				
		9,600 B	—	—	—	2,000,000	35,000 0 0
	„ 1857 -	800	1,000				
		1,000	500				
		2,000	200	3½ - -	As above.		
		3,000	300				
		6,800 C	—	—	—	2,000,000	35,000 0 0
18 & 19 Vict. c. 130. (1855)	8th Nov. 1860	500	1,000				
				3½ - -	As above.		
		1,000	500				
		1,500 D	—	—	—	1,000,000	17,500 0 0
		24,678				7,418,300	127,351 12 6

Viz. :— 2,962 of £1,000
4,334 „ 500
5,511 „ 200
11,871 „ 100

Total Number of Bonds - - 24,678

Appendix III.

No. 3.
Mr. Chisholm's Memorandum.

An Account, of all Exchequer Bills issued in the Three Years ended 31st December 1854, 1855, and 1856, showing the Number and Amount of Bills of each description, the Rate of Interest, and the Amount of Interest actually paid on Deficiency and Consolidated Fund Bills.

Description.	Number.	Amount.	Rate of Interest per Cent. per Diem.	Total Amount of Interest.	Remarks.
1853:		£ s. d.	d.	£ s. d.	
March Exchange	12,909	8,477,200 0 0	1	- - -	Interest increased to 2d. on and after 11th October 1853.
June „	10,753	5,890,500 0 0	1	- - -	
Supply Services	3,882	3,128,000 0 0	2		
Deficiency, April	32	1,407,812 7 11	1	62 10 0	Paid 13th July.
„ July	99	3,205,557 15 4	1	769 15 10	„ 15th October.
„ October	81	2,224,184 8 9	2	481 13 4	„ 14th January 1854.
	27,756	24,333,254 12 0			
1854:					
March Exchange	11,514	7,418,500 0 0	2		
June „	12,561	7,434,400 0 0	2¼		
1,750,000l. for Supply Services	2,090	1,250,000 0 0	2		
	830	500,000 0 0	2¼		
December Issues do.	823	655,500 0 0	2¼	- - -	Interest increased to 2½d. on and after 25th October 1855. Not yet exchanged.
Deficiency, January	123	3,711,201 8 9	2	2,817 1 8	Paid 18th April.
„ April	179	5,852,048 1 1	2	9,855 3 4	„ 13th July.
„ July	136	4,029,289 17 9	2¼	4,993 8 1	„ 7th November.
„ October	94	2,457,669 12 11	2	50 0 0	„ 17th January 1855.
Consolidated Fund, January	27	790,000 0 0	2	8,246 13 4	„ 13th July 1854.
Ditto, April	14	500,000 0 0	2¼	2,456 5 0	„ 7th November.
	28,391	34,598,609 0 6			
1855:					
March Exchange	11,254	7,299,700 0 0	2¼	- -	Interest increased to 2½d. on and after 25th October 1855.
June „	15,306	9,135,900 0 0	2		
Supply Services (21 August	5,500	3,500,000 0 0	2		
Deficiency, January	56	1,519,533 16 9	2	124 3 4	Paid 11th April.
„ April	105	3,467,094 4 6	2	6,535 8 4	„ 26 June.
„ July	102	3,306,433 8 4	2	2,676 13 4	„ 27th December.
„ October	30	853,442 16 5	2	Nil.	
Consolidated Fund, March	33	1,000,000 0 0	2¼	7,518	„ 26th June.
Ditto, April	54	1,740,000 0 0	2¼	19,230 18 9	„ 27th September.
	32,440	31,822,104 6 0			

No. 4.
Letter from
F. Hincks, Esq.

No. 4.

LETTER from F. HINCKS, Esq., Governor of Barbadoes, to the Right Hon. ROBERT LOWE.

My dear Mr. Lowe, Government House, Barbadoes, August 27, 1856.

IT is with some hesitation that I venture to intrude on your valuable time, and I would scarcely have ventured to do so but for your late speech on Mr. Brown's motion regarding a decimal currency, from which I have learned that you, though theoretically in favour of the decimal system, do not approve of the proposal of the association with which Mr. Brown is connected. I have thought a good deal on the subject, and have had to deal with it as a legislator, and I take sufficient interest in it to wish at all events that my views should have fair consideration. I had looked, I confess, on the people of England as so prejudiced in favour of the unit of a pound that there was little use in propounding anything else, but some months ago I got a circular from Lord Monteagle, with the printed list of questions, and I could not resist the opportunity of writing both to his Lordship and to Mr. Thornely (the latter for Mr. Brown's perusal) my views on the subject. I had by last mail a letter from Mr. Thornely, in which he informs me, what indeed I knew before, that Mr. Brown and his associates are very strong in favour of the sovereign as the unit, and that this would cause the least disturbance in the accounts. Others, he says, like me (the writer of this), hold a contrary opinion. Now if my views had been brought out in the debate I should not have presumed to push them forward again, but neither in the argument, nor in the statement made by Sir Cornewall Lewis of the various schemes, was the one I think best referred to. And yet I am surprised that it has attracted so little notice, because it certainly is not without advantages. If the dictum of Sir C. Wood is to prevail, that the pound must be the unit, of course there is no use in going further into the question, and any minor arrangements are quite indifferent to me. I think that both by yourself and Sir C. Lewis the evils of changing the values of the coins in general circulation among the poorer classes were clearly pointed out. I think that people of the higher and well-educated classes under estimate very much the discontent that will be produced by a disturbance of the currency, and I cannot help remarking that it is not a little extraordinary that these parties, merchants, bankers, &c., will not hear of disturbing the pound as the unit, although such change would involve no real alteration of value at all, but give them a little trouble, and disturb their calculations and interfere with their old customs, and yet they are ready to make a real change in the value of that coin which is the basis of all the calculations of the poor. Admitting freely that if you had an universal system the values of the coins would be disturbed by the exchanges, I do not think that a sufficient ground for not making an attempt, more especially when you also gain the very important point of not disturbing your existing currency. I would adopt the crown as the unit, *i. e.* a new crown of the value of the American dollar. The halfpenny would be the cent, and accounts could be kept, not in the absurd three column system advocated by Mr. Brown, but in crowns and cents. The crown would correspond with the dollar and also with the five-franc piece. The dollar currency is essentially that of the world. Even in countries such as that where I am now residing, although the currency is similar to that in England, and although there are no American coins in circulation, the money of account at the banks and in most of the shops is dollars and cents, and the notes in circulation are five-dollar bills worth 1*l.* 0*s.* 10*d.* All over the American continent you have the dollar, and it is forcing its way everywhere. The French sous, the American cent, and the English halfpenny or cent would be of similar value. All the French coins would suit admirably, as would the American gold ones. Gold might still be retained as the legal tender, and a gold coin struck "Royal," or what you like, worth five crowns, corresponding with the half-eagle of the United States, or four crowns corresponding with the twenty-franc piece of France. This plan would not be open to the objection regarding tolls, stamps, &c., or the infinite objections not raised specially, but with which all must be familiar. What, then, is the objection? None but prejudice in favour of the pound, which is too high an unit in my opinion. And what is the difficulty after all? A short calculation, much less intricate than what the poor would have to undergo, would bring any sum of pounds, shillings, and pence into crowns and cents. I admit there would for a time be some inconvenience in the change, but that must necessarily be the result of any change, and the inconvenience of the system which I advocate would be of a different kind; a man having to pay or receive 1,000*l.* would have, by a very short calculation, to ascertain that he had to pay or receive 4,800 crowns. Though I propose the multiple of the halfpenny as the unit, which would be most convenient as the money of account, I do not think that the crown would, as a coin, obtain any general circulation, any more than does the American silver dollar. The half-crown would be much more convenient and more generally adopted, and that would be worth 2*s.* 1*d.* of the present money, or little over the present florin; the name florin might be preserved. The subsidiary coins might be adopted as convenience should dictate. The objection to a silver coin of ten farthings is obvious, but there would be none to one of ten of your present halfpennys, which would be of the same value as the United States dime. Although, as I have already said, even if you had an universal system, the difference of exchanges would cause a difference in the

No. 4.
Letter from
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values of the different coins, still conventionally they would pass in the different countries at their respective values. For instance, a traveller in the United States would pass for every purpose that he required on steamboats, railroads, and hotels, an English five crown piece as a half-eagle, no matter what the rate of exchange. We know as a matter of fact that bills of other States in which there is a greater discount at the brokers than there would be on gold freely pass in the way I speak of. A common five-dollar bill will be readily taken at an hotel in New York, or on an American steamboat. English gold now passes freely in Paris, but how much more convenient for all parties if the coin were worth 20 or 25 francs exactly? and it would save travellers not only trouble, but, to use a vulgar American term, constant shaves. The standard should of course continue gold, and if, as I think would be much preferable, the five-crown gold coin were adopted it should be worth one sovereign and 1-24th. The crown, if issued at all as a coin, would be a token worth 100 halfpence, and 4*s.* 2*d.* of your present money, and it would, like all the subsidiary silver coins, be issued according to the present standard. The copper coins would not be changed at all. The dealings of the masses would in no way be interfered with. The merchants, who peculiarly want the change and who would benefit by it, would have a little temporary inconvenience and no more. I am sure that you will kindly excuse the trouble I give you in asking you to read the foregoing remarks, which I venture to hope are not wholly unworthy of some consideration.

Believe me,
Yours faithfully,
F. Hincks.

No. 5.

No. 5.
Sir J. F. W.
Herschel's Circular
to Bankers.

Circular to Bankers.

By Sir J. F. W. Herschel, Master of the Mint.

Gentlemen, Royal Mint, November 1854.

The Government being desirous of obtaining information on which to form a judgment how far the introduction of the florin or two-shilling piece as an element of the silver coinage of this country has been approved, and, if approved, how far on its own merits as a convenient element of value in itself, and in its relations to the higher and lower denominations of coin, and how far as a presumed stage in the transition to a Decimal Coinage with the Pound unit as its basis, I shall be much obliged by your informing me, at your early convenience, of your own impressions on these points, as grounded on the experience of your transactions with the public; and in particular (as regards the half-crown and the florin) whether it appears to you that any preference of the one over the other of these coins is manifested in the demand of the public for silver at your hands, and the grounds of such preference, in so far as they may have come to your knowledge.

I have, &c.
(Signed) J. F. W. Herschel,
Master of the Mint.

Messrs. & Co., Bankers.

Analysis of Replies.

Dear Sir, Royal Mint, 14th December 1854.

Having received a great number of replies to the circular which I have addressed to all the London bankers, except those exclusively or for the most part engaged in India or Colonial business, and to a great many of the principal country bankers (including the chief banks of Scotland and Ireland) on the subject of the acceptance of the florin by the public, of the draft of which circular you were pleased to approve, I proceed now to lay before you an abstract of the substance of those replies, as ranged under heads corresponding to those inquired into or others touched upon relating to the inquiry.

The reply of the Bank of England I subjoin in extenso, as it appears to have been drawn up with great care, and is specific in applying itself to the points of inquiry. As regards the others, it is not always easy to distinguish between the individual impressions of the writer and those of the firm which he represents, or to judge how far such impressions are individual, and how far a simple echo of the public sentiment. Of necessity, therefore, I must assume that in each case the partners of the firm, or the directors, sanction the replies given.

This premised, I may state the following as embodying my own impressions as to the preponderate tendencies in a mass of opinions very far from homogeneous.

1. The florin is very generally approved by the respondents per se as a convenient element of value, and in its relations to every other coin but the halfcrown, which it finds in pre-occupation of the field, and with which it has to contend under every disadvantage. As an element of the Decimal Coinage (supposing its competition with the halfcrown obviated either by withdrawal of the latter or by a better distinction between them), its approval is all but unanimous.

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2. A considerable number of banks speak of the florin as a coin generally approved by the public, and absolutely preferred to the halfcrown. Others as decidedly disliked. These may be balanced against each other, but the impression remains that nothing beyond its too great resemblance to the halfcrown, its comparative infrequency, and a certain defect of "ring" (a consequence of the proportion of its dimensions adapted for greater distinction from the halfcrown), prevent it from being at this moment a decidedly popular coin.

3. The concurrent circulation of the florin and halfcrown is very generally deprecated as a source of inconvenience and mistake. There is a desire all but unanimous that one or other should be withdrawn—the preference for retention (when any preference is expressed) being uniformly in favour of the florin.

I am, &c.
(Signed) J. F. W. Herschel.

To the Right Hon. the Chancellor of the Exchequer.

Bank of England, 12th November 1854.

There is some difficulty in answering the questions of the Master of the Mint, on account of the difference of opinions amongst the clerks.

The difference of opinion arises from the division of labour in the Bank, by which some clerks have only to deal with particular classes of the public.

In the silver offices all sums of silver above 20*l.* are received and paid; and when we have to deal on the one hand with the foremen and clerks of bakers, butchers, meat, poultry, and fishmongers, innkeepers, and other tradespeople who take large quantities of silver, and on the other hand, with the pay clerks of dock companies, builders, and railway contractors and others who require silver for weekly wages, to some of whom halfcrowns are especially useful, when their men are paid half a crown a-day, which is no uncommon rate, it may easily be imagined, that any innovation which would give to those persons a little extra trouble and something to learn would not be regarded with any favour, and to this day the fourpenny and threepenny pieces are with them a constant subject of complaint.

It is not to be expected, therefore, that they would welcome the florin on any account. Its novelty alone would be a strong objection, and as an introduction to a decimal system, of which they know nothing, and from which, as a change, they fear everything, it would be still more repugnant to them.

In counting mixed silver, the clerk first picks out the halfcrowns and crowns, as they do not count easily with the small silver on account of the odd sixpence in the halfcrown; he then counts the shillings and sixpences by two shillings worth at a time, placing his fingers upon the coins which make up the amount, which great practice enables him to do.

At present, he is obliged to pick out the florin with the half crowns on account of their similarity, and separate them afterwards; were there no halfcrowns, he would count the florins and small silver, separately, and instead of saying 2, 4, 6, &c. up to 20, he would put his fingers on the same coins and say, 1 2, 3, &c. up to the end, and the record would be in terms of the counting.

The questions of the Master of the Mint have been printed, and sent to the money offices of the Bank, and afterwards returned to me. I believe I may venture to state:—

1st. That generally, there is among traders a dislike to the introduction of new coins, but that no great objection has been made to the florin.

2d. That it is not an inconvenient quantity in itself, and that as a step towards the introduction of a Decimal Coinage, its value has been acknowledged wherever the subject seems to have been understood, and for that reason, probably, the opposition it would otherwise have had to encounter as a novelty has been small.

3d. The payers of wages prefer the halfcrown for the reason stated; but generally, the public do not manifest any preference of one before the other.

4th. The most decided opinion is expressed by all parties that the halfcrowns and the florins occasion great inconvenience circulating together, and those who look for a Decimal Coinage would desire to see the halfcrown withdrawn, and coined into shillings and sixpences.

(Signed) W. Miller.

December 12, 1854.

Dear Sir John,

The preceding statement in answer to your circular letter of inquiry about the silver coin has been prepared by Mr. Miller, after collecting the opinions which have been gathered from all parts of the house. The time required will explain the delay of the reply.

I remain, &c.
(Signed) J. G. Hubbard.

The Florin approved.

1. *Union Bank of London.*—Very generally approved by those who reflect. Its use is on the increase, and it is not objected to.

2. *Lubbock, Forster, and Co.*—Is the florin approved? Answer,—Yes, per se, and as an element of Decimal Coinage.

3. *Bosanquet, &c.*—Generally approved.

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4. *Commercial Bank of London.*—The florin is a useful coin, per se, and its value is increased as the decimal of a pound. It was originally objected to, but the objection is rapidly disappearing, and it would become popular were the halfcrown withdrawn.

5. *Price, Marryatt, and Co.*—As a new element of the coinage it has been generally welcomed and found convenient. This on its own merits, as they do not profess to give any opinion about it as an element of Decimal Coinage.

6. *Cumberland Union Bank.*—Its introduction has given much satisfaction.

7. *Cunliffe and Co., Lombard Street.*—It is approved by the country, both per se and in relation to coins of higher and lower value.

8. *Ulster Bank.*—From their experience they think the florin would become a favourite coin.

9. *Gurney, Norwich.*—Intrinsically we think the florin is at least equally convenient with the halfcrown, and perhaps more so.

10. *Gloucestershire Banking Company.*—It is generally regarded by the public as a convenient coin, and they are inclined to think so without any reference to its ultimate use in the Decimal Coinage.

11. *London Joint Stock Banking Company.*—The approval given to the florin rests not merely on its own merits as a convenient element, &c., but as a presumed stage to a Decimal Coinage.

12. *National Bank of Scotland.*—Generally approved by the business class of the community, both as convenient in itself and as a step to a Decimal Coinage. We entertain no doubt that there is a growing feeling in its favour.

13. *Royal British Bank.*—Our cashiers find the florin much more convenient in their payments and receipts from the public than the halfcrown. The public would prefer that only one of the two coins should be in circulation, and they are satisfied that the most desirable to retain would be the florin.

14. *Edinburgh and Glasgow Bank.*—So far as the directors can judge, the florin is a convenient element of the coinage, and as such has been generally approved by the public transacting business with the establishment.

15. *Old Bank, Chester.*—The florin, resting on its merits as a convenient element of value, &c., and as a presumed stage in transition to a Decimal Coinage is, we think, generally approved of.

16. *Lacey and Son.*—Regard it as a decided improvement, looking to a Decimal System, which they would be glad to see gradually introduced.

17. *Manchester and Salford.*—Our experience is not unfavourable to the florin, and we do not think that there would be any practical inconvenience in the simultaneous circulation of the florin and halfcrown, if properly distinguished.

18. *Perth Bank.*—Their experience leads them to believe that the florin would become very popular were the halfcrown withdrawn.

19. *East of England Bank.*—The two-shilling piece would certainly be a convenient element of value, and for computation and in relation to other coins, did it not clash with the halfcrown. The name florin is not popular; people think of a florin as twenty pence.

20. *Hanbury and Lloyd.*—Were the halfcrown withdrawn, the florin would be considered the most convenient coin.

21. *Newcastle Union Bank.*—The florin would prove a useful and convenient coin were the halfcrown removed, and, with a larger issue of sixpences, would make a very good substitute for the halfcrown.

22. *National Bank of Scotland.*—From old habit there seems to be a lingering preference for the halfcrown; but the calculations by the florin are so much more easy, that it would be a general favourite if the halfcrown were withdrawn.

23. *Manchester and Salford.*—Approve the florin; but think the halfcrown will never lose its value as an element of circulation, from its use in paying broken accounts.

The Florin disapproved.

1. *Jones, Lloyd, and Co.*—There is a general indisposition to receive it.

2. *Smith, Payne, and Co.*—Generally disliked.

3. *Sapte.*—The public evince a decided objection to it.

4. *Robarts, Curtis, and Co.*—The generality object to the florin.

5. *Lubbock and Forster.*—Their third cashier infers that it is not liked because it is not asked for.

6. *Strahan.*—Seldom asked for. Not by any means generally approved by the country.

7. *Dimsdale.*—Florin does not ring well; hence it is liable to be counterfeited, and is so.

8. *Cunliffe and Co.*—We do not like the florin; and many of our customers decline them. We could get up a petition to delay issuing any more.

9. *The Storekeeper at Woolwich.*—Excludes florins from his orders to the London and County Bank.

10. *Provincial Bank of Ireland.*—The florin is not approved, as the public have a strong predilection for what exists.

11. *Dundee Bank.*—Not felt to be any advantage, as the public would much prefer two shillings.

12. *Gurney, Norwich.*—Many persons request not to be paid in florins, but this seems to be the effect of habit only.

13. *Old Bank, Chester.*—The florin is not approved, but would have been had the halfcrowns been withdrawn. Both together cause mistakes.

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14. *North and South Wales Bank, Denbigh.*—Regarded in this neighbourhood with positive dislike, because they clash in size with the halfcrown.

15. *York Union Bank.*—Great objection to florin, partly as unnecessary, partly from concurrence with the halfcrown.

16. *Hallett, Robinson, and Co.*—Florin seldom asked for, and not unfrequently objected to on account of its similarity to the halfcrown.

17. *National Provincial Bank of England.*—The similarity to the halfcrown has hitherto produced a dislike of the florin; but the latter would be much preferred were the halfcrown withdrawn.

18. *Hanbury and Lloyd.*—The similarity to the halfcrown has hitherto produced a dislike of the florin; but the latter would be a more convenient coin were the halfcrowns withdrawn.

19. *Ransom and Co.*—Not approved, partly from causing confusion with the halfcrown, and partly for its dull sound.

The Florin preferred.

1. *Cunliffe and Son.*—The florin is much preferred to the halfcrown, and is decidedly a more convenient and useful coin. They are not able to state the grounds of preference, but think it arises from being a decimal coin.

2. *London and County Bank.*—The result of their experience is that (with exception of orders from the Storekeeper at Woolwich Dockyard), the public prefer the florin, and that as an element of the Decimal Coinage.

3. *Herries and Farquhar.*—1st. The florin has been greatly improved. 2d. It is a convenient coin, both in itself and in reference to other denominations. 3d. It is much preferred to the halfcrown. Many state their opinions to be grounded upon particular observation, and their experience of transactions with the public. Consider that the halfcrown, and not the florin, should be withdrawn.

4. *Worcester City and County Banking Company.*—Consider that the introduction of the florin has been universally approved, and that it has been judiciously selected in its relations to higher and lower denominations, and a step to a Decimal Coinage. They cannot doubt, from the general retention of the florin by the public, that the new coin has a decided preference, which they think would be placed beyond a doubt if the issues of the florin were equal to that of halfcrowns. It is a simpler coin, &c

5. *National Provincial Bank of England.*—The florin would be much preferred were the halfcrown withdrawn. The florin is very superior to the halfcrown, as containing no fraction of a shilling, and is simple.

6. *Bosanquet.*—One or other coin should be withdrawn; they think it should be the halfcrown.

7. *Stride and Co.*—Recommend the entire withdrawal of the halfcrown.

8. *Bank of Ireland.*—From experience of the public feeling, consider that were one or other coin to be withdrawn, the florin would be preferred as a step to a Decimal Coinage.

9. *Ulster Bank.*—The halfcrown should be speedily withdrawn, speaking from experience of the public feeling.

10. *Commercial Bank of Scotland.*—Our directors are of opinion it would be advantageous to the public to withdraw the halfcrown in favour of the florin.

11. *Perth Bank.*—Consider that the withdrawal of the halfcrown (as clashing with the florin) and the 4*d.* piece (as clashing with the 3*d.*) would be a great relief to the public.

12. *Wilts and Dorset Bank.*—The directors are of opinion that the halfcrown should be withdrawn and the florin retained in circulation.

13. *National Provincial Bank of England.*—The feeling seems very general that the halfcrown should be withdrawn, and the florin substituted.

No decided Preference to either the Florin or Halfcrown.

1. *Coutts and Co.*—No decided preference.

2. *London and Westminster Bank.*—No preference.

3. *Grote, Prescott, and Co.*—The florin readily taken, and no preference, or a very slight one, in favour of the halfcrown.

4. *Bosanquet.*—No marked preference for either; no feeling one way or other in the matter on the part of the public.

6. *Price and Co.*—From their observation the coins are taken indifferently, and no preference shewn.

7. *Commercial Bank of Scotland.*—The public have treated them very much alike, never certainly evincing any decided preference for the one over the other.

8. *Edinburgh and Glasgow Bank.*—Finds no decided preference, and would, therefore, retain both coins.

9. *Union Bank of Scotland, Glasgow.*—No decided preference of florin over halfcrown.

10. *Gosling and Sharpe.*—No preference. People seem to get very indifferent whether they take florins or halfcrowns; but their older customers would not like to lose the halfcrown.

11. *Chester Old Bank.*—Have not observed any preference manifested; but, owing to the scarcity of silver, any coin is readily taken.

12. *Lacy and Son, West Smithfield.*—We think no preference in favour of either.

13. *London Joint Stock Banking Company.*—Generally speaking, do not consider the public manifest a preference. When, the halfcrown is preferred—it is as a coin long in circulation.

14. *Devon and Cornwall Bank.*—Have not observed any manifest preference of one over the other. Both are convenient.

15. *Northampton Banking Company.*—The feeling is one of indifference. If there is a preference it is rather against the florin from its resemblance to the halfcrown. It does not seem of much importance what the coins are so long as there is a sufficient distinction.

16. *Bank of Liverpool.*—Are unable to say that any decided preference exists, owing to the limited circulation of the florin.

17. *Union Bank of Scotland, Edinburgh.*—No decided preference exists except where wages are paid at 2*s.* per day, in which case the florin is preferred.

18. *Curries & Co.*—Have occasionally remarked a preference for the halfcrown.

The Halfcrown preferred to the Florin.

1. *Messrs. Drummond.*—As far as they have any knowledge, the halfcrown is preferred. (Messrs. D. speak to this one point.)

2. *Jones, Lloyd & Co.*—A most marked preference for the halfcrown.

3. *Smith, Payne, & Co.*—The halfcrown preferred.

4. *Lubbock and Forster.*—One of their cashiers considers the halfcrown to be preferred.

5. *Williams and Co.*—Greatly preferred.

6. *Grote and Prescott.*—Slightly preferred, as better known.

7. *Rogers and Co.*—Halfcrown is preferred, as more convenient in the various combinations required.

8. *Stevenson.*—The public much prefer halfcrowns from being so long accustomed to them.

9. *Sapte,*
10. *Robarts, Curtis, & Co.* } Much preferred.

11. *Dimsdale.*—Halfcrown preferred, owing to the novelty of the florin and its bad ring.

12. *Belfast Banking Company.*—We observe a preference for the halfcrown over the florin, but probably arising from old habit.

13. *Perth Bank.*—So long as both circulate together, the halfcrown will have the preference from custom.

14. *Gurney, Norwich.*—In this district, the public generally appear to prefer the halfcrown, and many persons request not to be paid in florins; but this appears to be the effect of habit only.

15. *Lloyd and Entwistle.*—Have no doubt of the preference of the well known halfcrown over the seldom seen florin.

16. *East of England Bank.*—Halfcrowns preferred by their customers.

17. *Union Bank of Manchester.*—From inquiry of their clerks at the counter, the halfcrown is generally preferred.

18. *Spooner and Attwood.*—The halfcrown is generally preferred, more from old association, perhaps, than from any consideration of commercial advantage or inconvenience.

19. *Hankey, Bevan, and Trotter.*—Halfcrown preferred.

20. *Royal Bank of Scotland.*—The halfcrown preferred owing to its being familiar, and often serving for a sixpence.

21. *Willis, Percival, and Co.*—The halfcrown is generally preferred, but probably from habit.

22. *Huddersfield Bank.*—The manager believes the halfcrown is more convenient, but the difference is but little.

From experience of confusion and mistake caused by similarity.

1. Coutts and Co.
2. Praed and Co.
3. London and Westminster Bank.
4. Union Bank of London.
5. Lubbock, Forster, and Co.
6. Bosanquet.
7. Commercial Bank of London.
8. Curries and Co.
9. Robarts and Curtis.
10. Stride.
11. Bank of Ireland.
12. Ulster Bank.
13. Belfast Banking Company.
14. Provincial Bank of Ireland.
15. Dundee Bank.
16. Union Bank of Scotland.
17. Perth Bank.
18. Bank of Liverpool.
19. Gurney and Co., Norwich.
20. Lloyd, Entwistle, and Co.
21. Gloucestershire Banking Company.
22. Gurney, Birbeck, and Co., Lynn.
23. Old Bank, Chester.
24. North and South Wales Bank.
25. York Union Bank.
26. East of England Bank.
27. Spooner, Attwood, and Co.
28. Hankey, Bevan, and Trotter.
29. Lacy and Son.
30. Bouverie and Co.
31. Strahan.
32. Union Bank of Scotland, Glasgow.
33. Huddersfield Bank.
34. Dimsdale and Co.
35. Cumberland Union Bank.
36. National Bank of Scotland.
37. Newcastle Union Bank.

For Special Reasons.

Stevenson, Salt, and Sons.—The public dislike the inconvenience of keeping both coins.

No. 5.
Sir J. F. W. Herschel's Circular to Bankers.

Contrary Opinions.

Price, Maryatt, and Co.—The option of taking either florins or halfcrowns, or a portion of both, is considered a great convenience, and one the public would now evidently be little inclined to forego.

Edinburgh and Glasgow Bank.—Would retain both.

Manchester and Salford Bank.—Would keep both in circulation, but would make a better distinction between them.

The Halfcrown valued as a Fractional Coin, and as serving conveniently for a 6d.

Coutts, Praed, Lubbock, Bosanquet, Williams, Deacon, and Co., Provincial Bank of Ireland, Dundee Bank, Lloyd and Entwistle, North and South Wales Bank, York Union Bank, Royal Bank of Scotland. The whole force of the argument is, perhaps, most pointedly put by the *Union Bank of Newcastle*, as follows:—"In making a payment of 6*d.* as part of a large sum, you have the only real use of the halfcrown. Neither the crown nor the halfcrown are by any means needed in the silver coinage. The smaller denominations are the only ones which are really useful."

Contrary Opinion as to its Value in this respect.

National Provincial Bank of England.—Consider the florin, per se, superior to the halfcrown, because it does not involve fractions, and is simpler.

On the Appreciation of the Florin as a step towards a Decimal System.

1. *Praed.*—Consider the florin as desirable in this point of view.
2. *Bosanquet.*—The florin is favourably regarded as such a step by most who are capable of entering into the question.
3. *Commercial Bank of London.*—The florin useful per se, its value enhanced as the decimal of 1*l.*
4. *Herries, Farquhar, and Co.*—It is very convenient as an element of the Decimal Coinage, which they consider much to be desired.
5. *Lubbock and Co.*—(First cashier.) It is approved as a step towards a Decimal Coinage.
6. *Cunliffe and Co.*—Think the reason why the public prefer the florin is, that it is a decimal coin.
7. *Dimsdale and Co.*—Consider that its introduction will facilitate the change.
8. *Belfast Banking Company.*—Think the introduction of the florin a most proper step in that direction.
9. *Union Bank of Scotland.*—The public feeling is decidedly in favour of a Decimal System, and of the florin as a step towards it.
10. *Perth Bank.*—Ditto, very judicious and important.
11. *Bank of London.*—Think that as a step to a Decimal Coinage the sooner the florin can be altogether substituted for the halfcrown the better.
12. *Devon and Cornwall Bank.*—Distinctly of opinion that the florin is of great importance as a presumed step in such a transition, and should be continued.
13. *Lloyd, Entwistle, and Co., Manchester.*—As a step to the Decimal System the florin is approved, but they complain of the absence of interest in that system, whose merits they consider not fully appreciated.
14. *North and South Wales Bank.*—The florin would obtain immediate favour were the halfcrown withdrawn.
15. *Cumberland Union Bank.*—Were the halfcrown withdrawn, the florin would be looked upon with still more satisfaction as a first step to a Decimal Coinage, which is so universally desired.
16. *Huddersfield Bank.*—Goes into the question of the Decimal System, which it considers very desirable, but without stating any impression as to the reception of the florin on that score.
17. *Dundee Bank.*—Does not consider that the public take any interest in the question, and do not consider the florin to be appreciated on that account.
18. *Ransam and Co.*—As a step to a Decimal Coinage its importance is fully appreciated.
19. *National Provincial Bank of England.*—As a step to a Decimal Coinage it has not been much considered.
20. *Wilts and Dorset Banking Company.*—Consider it a most desirable thing as a step towards a Decimal Coinage.

21. *Coutts and Co.*
22. *Bouverie and Co.*
23. *Price and Co.*
24. *Curries and Co.*

} Can give no opinion on the point.

25. *Union Bank of Scotland, Glasgow.*—There is no great desire in Glasgow for a Decimal System, nor for the florin as a part of it.
26. *Union Bank of Scotland, Edinburgh.*—The manager sends a scheme of a Decimal System.
27. *Sapte and Co.*—Would be sorry to see a change to a Decimal Coinage.
28. *Willis, Percival, and Co.*—On the contrary, think it would be an improvement.
29. *Union Bank of Newcastle.*—Consider that no one can form an opinion of the florin as a stage to a Decimal Coinage till tried as part of a whole system, and the sooner that is done, in their opinion, the better.

No. 6.

No. 6. Messrs. Heaton and Son's Circular Queries.

ANSWERS to QUERIES as to DECIMAL COINAGE, circulated by R. HEATON and SONS, of Birmingham, Contractors for Copper Coinage, dated 8th June 1855.

Communicated by THOS. GRAHAM, ESQ., F.R.S., Master of the Mint.

Name and Address.	Trade and Occupation.	Qu. Has a Decimal Coinage ever engaged your attention?		Qu. Please state your ideas thereon.	
				Answer favourable.	Answer unfavourable.
Joshua Harris, New Union Mill Company, Islington, Birmingham.	Secretary to New Union Bread and Flour Mill Company.	- -	- -	- - - -	We never use smaller than halfpence, and consider any smaller coin troublesome and unnecessary.
Old Union Mill Company, Holte Street, Birmingham.	- - -	Yes -	- -	- - - -	As not being required, useless.
Thomas Parkinson, Back Lane, Blackburn.	Lamp maker	- -	Not much	I think it would act very well, not only with respect to the coinage, but also weights and measures.	
Jno. Darbyshire, Bank of Bolton -	Bank manager.	- -	Not very much.	I think it would be an improvement, if it were not that the present coinage seems to meet every requirement.	
John Harwood, Bolton - -	Corn factor	- -	Not much	It would be very convenient when established.	
W. Penn Smith, 26, Hanover Street, Liverpool.	Lamp maker	Yes -	- -	Desirable, but not considered so by the vast majority who have had no experience of its advantages in other countries.	
E. Turner, 55, King Street, Manchester.	Gas Office	- -	Not particularly.	Though I think it highly desirable.	
Henry Tibbet, 5, Orchard Street, Newcastle-on-Tyne.	Parish overseer.	- -	No -	- - - -	I think the present coinage answers all the purposes.
Thomas Boundy, Northampton Place, Swansea.	Metal refiner	- -	- -	For my own part I think the Decimal Coins much wanted, but the trade here does not seem to desire them.	
David Walters, Swansea - -	Shopkeeper -	- -	No -	- - - -	Not wanted in this neighbourhood.
Edward Adcock, 43, Dale End, Birmingham.	Grocer -		No - -	It would take a great work of time to become useful.	
J. L. Brierley, 104, Dale End, Birmingham.	Bookseller -	Yes -	- -	I conceive it to be the most easy and natural calculation; if adopted would be soon understood, and give great facility to business matters. It is a rule with me to count change by tens, because I find that I am always correct.	
Hinks, Wells, and Co., Buckingham Street, Birmingham.	Steel pen makers.	Yes -	- -	We believe it would be a great improvement over the present system, and give very great facilities.	
Holyday, Lewis, and Co., New Street, Birmingham.	Drapers -	Yes -	- -	The advantages are so numerous that time and space will not admit of our entering on the subject here. We apprehend that every tradesman that has read the evidence given before the Committee of the House of Commons on the subject can have but one opinion, and that must be in favour of the decimal coinage.	
Laings and Co., 33 to 36, High Street, Birmingham.	Drapers -	- -	No. -	- - - -	The present is satisfactory.
G. F. Muntz, M.P. for Birmingham	- -	Yes -	- -	I am favourable to a Decimal Coinage.	
Thomas Pemberton & Sons, Birmingham.	Brass founders.	- -	No. -	- - - -	We think the change uncalled for, because we find no inconvenience as we are.
W. Bollans, Bradford - - -	Plumber, &c.	- -	No. -	- - - -	I think we should not get any benefit by it.

No. 6. Messrs. Heaton and Son's Circular Queries.

Answers to Queries as to Decimal Coinage, circulated by R. Heaton and Sons—*continued.*

Name and Address.	Trade and Occupation.	Qu. Has a Decimal Coinage ever engaged your attention?		Qu. Please state your ideas thereon.	
				Answer favourable.	Answer unfavourable.
Laurence and Robinson, Bradford	Ironmongers	Yes		It would facilitate business materially. Calculations would be readily made, and correctly, too.	
Thomas Hale and Co., Bristol	Brass founders	Yes			Not immediately required.
E. Hollin, Dudley	Chemist	Yes		I have not seen a scheme yet in which I fear the inconvenience attending its introduction would not counterbalance the advantages attendant upon its use. Could this be obviated, the use of Decimal Coinage and Measures would be very desirable.	
J. C. Cook, Dudley	Ironmonger		Not much		I consider the benefits will not be equivalent to the enormous loss and confusion of the exchange.
J. Wood, Dudley	Spirit merchant.	Yes		I think it desirable.	
John Vickery, 84, Fore Street, Exeter	Gas fitter	Yes		Consider it essential to commercial interest.	
John Moody, Halifax and Huddersfield Union Bank.	Cashier	Yes		Cannot doubt that it is desirable, though it must produce vast inconvenience and derangement for the time.	
James Heron, West Riding Union Banking Company, Huddersfield.	Manager	Yes		I think the Decimal System would very soon be applied and approved.	
Thomas Attwood, Lewes	Patentee		No		I have an idea that the very small coin proposed in the use of Decimal Coinage would be inconvenient.
Thomas W. Cross and Co., Washington Street, Leeds.		Yes		And think we ought by all means to have a Decimal System in both coinage and weights. (Our Mr. Cross has a system of his own, not yet made public.)	
Jacob Lilley, 23, Vicar Lane, Leeds	Brass founder	A little			I do not see much advantage to the public at large in changing the coinage; it may suit a few commercial men or bankers; but to disturb a whole country in the alteration, when everyone understands his own coin, in my opinion is nonsense.
William Richardson, Sherwood Yard, Briggate, Leeds.	Coppersmith	Yes		The very best and simplest that could be adopted.	
Joseph Wood and Son, 3, Sherwood's Yard, 42, Briggate, Leeds.	Decorators	Yes		The very best and simplest that could be adopted.	
Thomas B. Hardman, 38, Regent's Road, Liverpool.	Druggist	Yes		Think it would be very convenient.	
51, Fetter Lane, London.	Oilman	Yes		Simplify our reckoning very much; but cannot judge if desirable to make alteration general.	
Everett and Co., 51, Fetter Lane, London.	Blacking makers.	Yes		We are decidedly in favour of it, preserving the present pound sterling intact.	
George Jones, Nevill's Court, Fetter Lane, London.	Lamp maker		No		I think it quite unnecessary.
John Yeomans and Son, 79, Arundel Street, London.		Yes		Its introduction would be of great advantage, from its greater simplicity and readiness of calculation; nor do we think that near the inconvenience would arise from its introduction which some people anticipate.	
Hulett, 55 and 56, High Holborn, London.	Lamp maker	Yes		I think it would be a great boon in a great commercial nation like England. It would very much simplify our calculations. I consider the system much better in France.	

Answers to Queries as to Decimal Coinage, circulated by R. Heaton and Sons—*continued.*

No. 6. Messrs. Heaton and Son's Circular Queries.

Name and Address.	Trade and Occupation.	Qu. Has a Decimal Coinage ever engaged your attention?	Qu. Please state your ideas thereon.	
			Answer favourable.	Answer unfavourable.
William Jackson, 59, Crown Street, Finsbury Square, London.	Copper and brass warehouse.	Yes	I consider a Decimal Coinage would be a great boon to all the commercial establishments throughout the kingdom.	
Stevens and Son, Darlington Works, Southwark.	Engineers, brass founders, &c.	Yes	We consider it would be most desirable, and greatly facilitate business transactions.	
Thomas Tuck and Son, 190, Strand, London.	Lamp warehouse.	Yes	Consider it would be a great convenience and advantage in trade if the scheme could be carried out, but it would have many difficulties to encounter to remove the long-established notions. That overcome, the advantages, in our judgment, would be very considerable.	
John Warner and Sons, 8, Crescent, Jewin Street, London.	Makers of decimal weights for the bullion trade.	Yes	See their answer as to Decimal Coins, Weights, and Measures.	
Bradshaw, Blacklock, and Co., 47, Brown Street, Manchester.	Railway Guide Office.	Yes	In favour.	
George Hartlewell, 2, St. Mary's Street, Manchester.	Plumber	Yes	I think it would greatly facilitate commercial transactions, but would also prove very inconvenient for the working classes.	
William Oxley and Co., St. Mary's Street, Manchester.	Ironmongers	Yes	The best thing that could be done for the country. It would revolutionize the whole system of calculation for the better. The system is now compound; by decimals it would be simple.	
Taylor and Turner, Manchester	Wholesale drapers.	Yes	We think something similar to the American system would be advantageous.	
Bladen and Nash, Rugeley	Brassfounders	No		But cannot see any necessity for it.
Guest and Chinne, Rotherham	Brass and iron founders.	Yes	We think it would facilitate counting-house and general business transactions to an important extent.	
Charles Storey, Bank House, Rotherham.		Yes		Scarcely required.
Wigfield and Sons, Rotherham	Grocers	Not much		We think our present coinage quite sufficient for our business.
Samuel Ashworth, Toad Lane, Rochdale.	Pioneer's store.	Some little.	I think it would take a long time before they all get used to it.	
John Petrie, Rochdale	Iron merchant.	No	It would be attended with advantage when thoroughly established, but great difficulty would attend it on the outset.	
Aitcheson, Stamforth, and Co., Sheffield.	Wicker brass works.	Yes	That it would materially facilitate the operations of trade, and be highly beneficial to merchants and traders.	
Henry Harely, 31, Wicker, Sheffield				I think any change will be a great inconvenience to the retail trade.
Edwin Unwin, United Gas Light Company, Sheffield.	Manager of Gas Company.	Yes	I highly approve of the recommendation of a Decimal Coinage made by two Royal Commissions, and by a Committee of the House of Commons.	
Thomas Wheeler, Stockport	Tea dealer.	No		Quite content with present arrangement

No. 6. Messrs. Heaton and Son's Circular Queries.

Answers to Queries as to Decimal Coinage, circulated by R. Heaton and Sons—*continued.*

Name and Address.	Trade and Occupation.	Qu. Has a Decimal Coinage ever engaged your attention?		Qu. Please state your ideas thereon.	
				Answer favourable.	Answer unfavourable.
Kershaw, Leese, & Co., Stockport	-	Yes	-	We think a Decimal Coinage would facilitate business transactions generally, and tend to simplify the keeping of accounts.	
Jaques and Knowles, Stockton-on-Tees.	Grocers	-	No	-	Hardly think it practicable.
Smith and Hind, Stockton-on-Tees	Lamp makers	Yes	-	We think the Decimal Coinage would be much better than the present system.	
Cowley and Madely, Walsall	Patent Tube Works.	Yes	-	-	We think it would make years of confusion, and also tend to lessen the scale of profits.
Richard P. Tallis, Walsall	Accountant	Yes	-	It would eventually answer well, and our successors would thank us for it, but the present inconvenience would be great. The prospective benefit would greatly preponderate over the present inconvenience.	
W. H. Dike, Wakefield and Barnaby Union Bank, Wakefield.	Bank manager.	It has	-	I think, after considerable inconvenience, it would add greatly to the facility of keeping accounts, so much so that the primary inconvenience should not be taken into consideration; and that the Decimal System should not be confined to money transactions, but should extend also to weights and measures.	
C. A. Loxton, High Street, Wednesbury.	-	Yes	-	-	I think the inconvenience would be greater than the advantage.
George Muntz, at J. Runnell and Sons, Tube Works, Wednesbury	-	Yes	-	Having lived in France I am decidedly in favour of Decimal Coinage.	
Richard Pildesly, Willenhall	Brass founder	-	No	-	Nor do not see the use of such coinage. I think it would be nonsense to have any such coinage. I think we should do better without any such coinage.
Thomas Ellwell and Sons, Wolverhampton.	Merchants, &c.	-	Not much	-	We think it would be attended with great inconvenience, both at home and the colonies, accounts.
Fred. Walton & Co., Wolverhampton	Tin and Japan manufacturers.	Yes	-	It is the only perfect mode of keeping accounts, whether of money or quantities.	
Francis Taylor, Union Banking Company, York.	Bank manager.	-	Not particularly.	-	It is not liked in this neighbourhood.
Edmond Richardson, 23, Pavement, York.	-	A little, and the less the better.	-	-	I think the present coinage quite sufficient for all retail and wholesale trade in England.
Joseph Braddick, United Gas Light Company, York.	Clerk	Yes	-	I believe it would be a great boon to posterity, but very difficult to introduce; and ought to be based on one universal standard.	
SCOTLAND.					
Mitchell Brothers, Dalkeith	-	Yes	-	We are in favour of a Decimal Coinage, but are not clear as to the unit that should be adopted. Many inconveniences would be connected with relinquishing the pound, but we think that the tenpenny would form a more useful unit of amount.	
E. B. Bothwell, 25, Justice Street, Aberdeen.	-	Yes	-	The feeling in Aberdeen is decidedly favourable to the adoption of a Decimal Coinage.	

Answers to Queries as to Decimal Coinage, circulated by R. Heaton and Sons—*continued.*

No. 6. Messrs. Heaton and Son's Circular Queries

Name and Address.	Trade and Occupation.	Qu. Has a Decimal Coinage ever engaged your attention?		Qu. Please state your ideas thereon.	
				Answer favourable.	Answer unfavourable.
Robert Stevens, 214, George Street, Aberdeen.	- - -	- -	No -	- - - -	And being one who loves old usages, &c., would prefer the present coinage. I understand the present coinage, and would not like the trouble of a change.
John Wilson, 12, Catherine Street, Edinburgh.	Brass founder.	- -	No -	- - - -	The Decimal Coin is too small for Scotland.
J. Westland, North of Scotland Banking Company, Aberdeen.	Banker -	Yes -	- -	I think it would be a great improvement, and would facilitate materially the operations of accounts. I believe that, having regard to our existing monetary scale, the pound sterling would be the most convenient integer to adopt for a Decimal Coinage.	
John M'Pherson, Aberdeen - -	Comb manufacturer.	Yes -	- -	My impression is, that while Decimal Coinage would be very advantageous in book-keeping, it at the same time would be inconvenient in small purchases, and in all transactions with the working classes where wages are made up on the piece-work principle, such as my own trade.	
Farquhar & Gill, 24, Upper Kirk Gate, Aberdeen.	Plumber and brass founders.	- -	Not much	We think it would greatly simplify business transactions.	
John Stephen, Aberdeen - -	Plumber -	It has been discussed here.	- -	- - - -	I am of opinion that the coin should remain as at present.
James Cowan, Dundee - - -	Brass founder and plumber.	Yes -	- -	I think it would be a great boon to the trading part of the community.	
Thomas H. Baxter, 25, Murray Gate, Dundee.	Grocer -	Yes -	- -	Desirable; but am afraid the difficulties in carrying out the plan are almost insurmountable.	
Robert Thomson & Sons, Dalkeith -	Plumbers -	Yes -	- -	We are in favour of Decimal Coinage.	
J. Smeall, Dunfermline - -	Plumber -	Yes -	- -	It would forward business, and be a great improvement.	
John Sampson, Dunfermline - -	Merchant -	Yes -	- -	It would forward business quicker, but would have its difficulties for a considerable time with the general public, who would require a great deal of teaching and explanation that they were not cheated.	
James Bruce, Dunfermline - -	Merchant -	Yes -	- -	I think it would expedite business very much, and be a very great improvement on the present coinage.	
Caldwell Brothers, Edinburgh -	Booksellers -	Yes -	- -	We think it would be a very great improvement, and simplify account keeping. The lower classes would be a little confused in their reckoning at first, but the inconvenience would gradually subside, and the benefit remain. Retailers and merchants would be much benefitted, it would be so easy to calculate rapidly. The pound sterling ought to be the unit.	
Alex. Mackenzie, Commercial Bank of Scotland, Elgin.	Bank agent	Yes -	- -	That it would facilitate greatly the keeping of our books.	

No. 6. Messrs. Heaton and Son's Circular Queries.

Answers to Queries as to Decimal Coinage, circulated by R. Heaton and Sons—*continued.*

Name and Address.	Trade and Occupation.	Qu. Has a Decimal Coinage ever engaged your attention?		Qu. Please state your ideas thereon.	
				Answer favourable.	Answer unfavourable.
John Neil & Co., 44 North Hanover Street, Edinburgh.	Lamp manufacturer.	Yes	-	And would be in favour of its being adopted.	
Charles Taylor, 82, High Street, Edinburgh.	- - -	Yes	-	That both coins would require to be in circulation at the same time until the community understood the advantage of the Decimal.	
Smiths & Co., 1, Blair Street, Edinburgh.	Lamp makers	Yes	-	- - - -	The alteration would be at first embarrassing.
James Couper & Co., City Glass Works, Glasgow.	Glass Works	-	Not much	- - - -	Our opinion is,—Not desired in this quarter.
John Finlay, 46, Buchanan Street, Glasgow.	Ironmonger-	-	No	- - - -	Would prefer the present coinage to a Decimal Coinage.
Thomas Lockerby, Victoria Works, Glasgow.	Lamp manufacturer.	-	No	- - - -	I think the change would be attended with great inconvenience as to the payment of wages.
Stephenson and Allardice, Glasgow	Chandelier, &c. manufacturer.	-	Not much	- - - -	Would "let well alone." The halfcrown piece is the most useful coin we have, and the Decimal Coinage would do away with it.
Wright Brothers, 187, Argyll, Street Glasgow.	- - -	Slightly	-	That it would be a great boon, but would be attended with difficulty in introducing its operation among the working classes.	
Alexander Thomson, Greenock Bank, Greenock.	Bank manager.	Yes	-	With our old denominations we get on very well with what our customers understand best. The difficulty is to teach and reconcile our common population to a decimal coinage.	
Thomas Roden, Hamilton Street, Greenock.	- - -	-	No	That it would greatly facilitate the keeping of accounts.	
Cowan and Lawrie, Greenock	Drapers	Yes	-	- - - -	I think it better for retail shops that the currency should remain as it is.
John Sturroch and Sons, 1, Duke Street, Leith.	Ironmongers	-	No	- - - -	There appears to be a very considerable diversity of opinion, and we should rather say unfavourable, as it would affect a great many parties whose prices, &c. do not square with decimal divisions.
William Logie, 2, Mill Street, Perth	- - -	-	No	I think it would suit well.	
Gibson and Reddie, Stirling	Plumbers	-	No	- - - -	This subject has not engrossed our attention much, but believe that it would overturn all present arrangements of business, only produce confusion.
James M. Morrison, Commercial Bank of Scotland, Stirling.	- - -	Yes	-	- - - -	A total subversion of the present system of calculation and book-keeping, tending to no improvement, and moreover being a copying from the foreigner, who, I think, should imitate us.
IRELAND.					
Thomas Hudson, High Street, Belfast.	- - -	Yes	-	- - - -	I think the introduction of a Decimal Coinage would increase the difficulty of reckoning, and would give rise to serious confusion among all classes.
John Magee, 32, Ann Street, Belfast	- - -	-	No	I consider it would be a progressive step; but it would be rather difficult to introduce.	
William A. Rolt, 28, High Street, Belfast.	- - -	Yes	-	Quite in favour of it. I believe the majority of our merchants here are the same.	
Bernard Hughie, Railway Bakery, Belfast.	Railway bakery.	Yes	-	I think it would tend to simplify money calculations, and give a greater facility in business.	

Answers to Queries as to Decimal Coinage, circulated by R. Heaton and Sons—*continued.*

No. 6. Messrs. Heaton and Son's Circular Queries.

Name and Address.	Trade and Occupation.	Qu. Has a Decimal Coinage ever engaged your attention?		Qu. Please state your ideas thereon.	
				Answer favourable.	Answer unfavourable.
John Lane, 33, George Street, Cork	Lamp, &c. -	Yes -	- -	I consider a very great advantage.	
John Stevenson, 114, Grafton Street, Dublin.	Gas Company.	Yes -	- -	That it would be attended with great advantage and convenience to the mercantile community.	
J. Edmund, Sons, and Co., Dublin -	Ironmongers	Yes -	- -	A sensible plan.	
Thomas Hodges, 99, Abbey Street, Dublin.	Brass and bell founders.	- -	- -	Favourable. (See answer.)	
Arthur Guiness and Co., James' Gate, Dublin.	Brewers -	- -	Not much	If once adopted it would be a decided improvement, and that most of the practical difficulties of its introduction seem ingeniously softened or obviated by suggestions already before the public.	
G. Sanders, Forbes Place, Dublin -	Secretary to Hibernian Gardens.	Yes -	- -	It would be most desirable. I was accustomed to it in Belgium, and know how to value decimal modes of reckoning.	

ANALYSIS OF ANSWERS.

Answer to First Query.	Answers to Second Query, Favourable to Decimal Coinage.	Answers to Second Query, Unfavourable to Decimal Coinage.	Answers to Second Query, Doubtful.	Totals.
Yes - -	52	13	8	73
No - -	7	23	3	33
No Answers - -	2	2	0	4
Total - -	61	38	11	110

No. 7.

No. 7. Manufacturers. Manchester.

COMMUNICATION FROM THE UNDERSIGNED MANUFACTURERS AT MANCHESTER.

Manchester, May 1856.

TO THE ROYAL COMMISSION ON THE DECIMAL COINAGE.

WE, the undersigned, being millowners and employers of labour, are of opinion that, were the coinage altered to a Decimal System, it would be of general advantage, and we do not think any difficulty will be found to prevent its successful operation.

ELKANAH ARMITAGE & Co., Cotton Spinners and Manufacturers.
J. and N. PHILIPS & Co., Manufacturers.
KERSHAW, LEESE, & Co., Merchants and Manufacturers, and Calico Printers.
R. H. GREG & Co., Cotton Spinners and Merchants.
ASPILL and BRADLEY, Spinners and Manufacturers.
JAS. ECKERSLEY and SONS, Cotton Spinners and Manufacturers.
JAMES KING and SONS, do. do.
HOLDSWORTH, Bros., Cotton Spinners.
RICHARDSON, TEE, RYCROFT, & Co., Manufacturers of Linen, and of Mixtures of Silk, Wool, and Cotton.
MARLAND and WHITCOMBE, Manufacturers.
C. A. BRIERLEY and SONS, Cotton Spinners and Manufacturers.
ARMITAGE and WARD, Cotton Spinners and Manufacturers.
RYLANDS and SONS, Cotton Spinners and Manufacturers.

No. 8.
Petitions to House of Commons.

No. 8.

List of Petitions to the House of Commons for Adoption of Decimal Coinage.

Session 1854.

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American Chamber of Commerce, Liverpool.
Andover.
Arbroath.
Ashton-under-Lyne.
Ayr.
Bingley.
Blackburn.
Bolton.
Bradford, Chamber of Commerce.
Burnley.
Cambridge.
Cardiff.
Clitheroe.
Dalkeith.
Derby.
Dumfries.
Dunbar.
Dundee.
Dundee, Chamber of Commerce.
Encouragement of Arts, Manufactures, &c., Society.
Falmouth.
Farnworth.
Glasgow.
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Newport.
Newport, Isle of Wight.
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Salford.
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Southampton, Chamber of Commerce.
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Swansea.
Tynemouth.
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Session 1855.

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Belfast.
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Egerton in Turton.
Epworth.
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Halifax.
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„ Chamber of Commerce.
„ Airedale Foundry Operatives.
Liverpool, Iron Merchants and Metal Brokers.
„ Mechanics' Institution.
„ Teachers of Mulberry Street School.
„ Architectural and Archæological Society.
„ Friendly Burial Society.
„ Chamber of Commerce.
London, Merchants and Bankers.
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Manchester, Firm of Messrs. Callender & Co.
„ Merchants and others.
„ Firm of Bannerman & Sons.
„ Firm of James M'Laurent Nephews.
From Manchester, Firm of James Carlton, Walker, & Co.
„ Firm of M. Philips & Co.
„ Firm of Kershaw, Leeds, Side-bottom, & Co.
„ Rylands & Sons.
„ Firm of Potters & Norris.
„ Oxford Road Twist Company's Mills.
„ Firm of Richard Johnson & Brothers.
„ Operatives employed in.
„ Firm of Joseph Whitworth & Co.
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„ Schoolmasters, Teachers, &c.
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Sturminster.
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Warrington.
Wetherby.
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Woodhouse.
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No. 8.
Petitions to House of Commons.

PETITIONS TO THE HOUSE OF COMMONS

In favour of the Scheme of Decimal Coinage recommended by the Committee of 1853.

Ordered to be printed by the House of Commons.

Session 1854.

Tynemouth Corporation.

The humble Petition of the Mayor, Aldermen, and Burgesses of the borough of Tynemouth, in the county of Northumberland,

Sheweth,

That your Petitioners are of opinion that, both in an educational and commercial point of view, very great advantages would arise from the adoption in this country of the decimal system of coinage, unanimously recommended by the Report of the Committee of your honourable House appointed to inquire into this subject.

That it appears to your Petitioners that, by the adoption of the decimal coinage, the labour of teaching arithmetic would be materially abridged, and monetary transactions simplified, the chances of error would be lessened, and scientific and difficult calculations rendered easier of accomplishment; and that to a nation engaged in extensive mercantile transactions, the saving of labour in bookkeeping alone would be of great importance.

That your Petitioners do not believe that any insuperable difficulties would arise on the introduction of a decimal coinage into this country, but that, on the contrary, the transition would be easily and readily made; and that any temporary inconvenience consequent thereon would be far outweighed by the superior facilities which a system of pure decimal currency would undoubtedly afford.

Your Petitioners therefore humbly pray that your honourable House will be pleased, at the earliest possible period, to take the subject of a decimal coinage into consideration, and to adopt such measures in relation thereto as your honourable House shall deem proper.

And your Petitioners will ever pray, &c.

Given under the common corporate seal of the said borough of Tynemouth, this eighteenth day of January, one thousand eight hundred and fifty-four,

M. Popplewell, Mayor.

Salford Corporation.

The humble Petition of the Mayor, Aldermen, and Burgesses of the borough of Salford, in the county of Lancaster, in council assembled,

Sheweth,

That your Petitioners are deeply sensible of the important advantages which would accrue to the kingdom at large by the adoption of a decimal system of money and accounts, by affording facilities to trade and commerce, which, in comparison with the present system, can scarcely be overrated.

That your Petitioners are of opinion that a decimal system of money and accounts would not only be a valuable boon to the commercial, mercantile, and banking interests, both in their home and foreign relations, but also to the mass of the industrial and working classes, and to the multitudes of small dealers and shopkeepers, who, from the simplicity of the system, your Petitioners believe, would speedily understand and appreciate it.

That, inasmuch as all the silver coins now in circulation, with the exception of the half-crowns and the threepenny and fourpenny pieces, are fortunately decimal divisions of the pound sterling, and that, inasmuch as the only change required would be in copper coins to the small extent of four per cent., the present florin, by the adoption of the system, being divisible into 100 cents or farthings instead of 96 as at present, your Petitioners beg to express to your honourable House their conviction that the transition from the present complex system would be easy to effect, and would be attended with a cost so small compared with the important advantages to be gained as to be unworthy of consideration.

That your Petitioners rejoice that the principle of a decimal system of money and accounts has already been recognised by the coinage of the florin, the first and a most important step in a decimal currency.

That your Petitioners, without committing themselves to all its details, cordially approve of the main outlines of the Report of the Parliamentary Committee of last Session on a decimal coinage, and especially of the recommendation to make the pound sterling the integer, as your Petitioners are decidedly of opinion that upon no other plan, so free from difficulty and objection, could a decimal system be framed.

Your Petitioners therefore humbly pray that your honourable House will early adopt such measures as will lead to the complete establishments of a decimal system of money and accounts.

And your Petitioners will ever pray.

William Ross, Mayor.

No. 8.
Petitions to House of Commons.

Dunbar Corporation.

The humble Petition of the Provost, Magistrates, and Town Council of the royal burgh of Dunbar,

Sheweth,

That your Petitioners are much interested in every improvement calculated to simplify the coinage, and consequently the keeping of accounts, and are of opinion that the adoption of a pure decimal currency would be a vast improvement on the present system.

Your Petitioners therefore humbly pray that your honourable House will be pleased at the earliest possible period to pass an Act legalising decimal coinage all over the country.

And your Petitioners will ever pray.

Signed for and as authorised by the magistrates and the council, and the corporation seal is hereto affixed by me.

JOHN KELLY, Provost.

11 Jan. 1854.

Cambridge Corporation.

The humble Petition of the Mayor, Aldermen, and Burgesses of the borough of Cambridge,

Sheweth,

That a Committee of your honourable House, after due examination of the question, have lately recommended the adoption of a decimal system of coinage.

That your Petitioners believe that such a system will simplify accounts and monetary transactions, and thereby and otherwise be found highly beneficial.

Wherefore your Petitioners humbly pray that your honourable House will be pleased to take such measures as to your wisdom may appear expedient for the purpose of introducing the decimal system into the coinage of the kingdom at as early a period as your honourable House may deem practicable.

Given under the common seal of the borough aforesaid at a council holden at the guildhall there, on the second day of February, in the year of our Lord one thousand eight hundred and fifty-four. (Seal.)

Accrington and neighbourhood.

The humble Petition of the Inhabitants of Accrington, Church, Oswaldtwistle, Clayton-le-Moors, and neighbourhood,

Sheweth,

That they have seen with great satisfaction the Report of a Committee of your honourable House, generally known as the Decimal Coinage Committee, and most fully concur in the plan it has suggested and recommended of taking the pound sterling as the unit of account.

That they consider this of much importance, as their rents, leases, and engagements have reference to the sovereign, and any disturbance of it would cause great embarrassment.

That the simplicity of a decimal system over that now in use, in abridging the time necessary for the instruction of youth in obtaining a more perfect knowledge of arithmetic, and with advantage to the commercial interests of the country, is a consideration of so much importance, your Petitioners humbly pray that your honourable House will lose no time in passing such laws as will secure this boon to the United Kingdom.

And your Petitioners, as in duty bound, will ever pray.

JOHN HARGREAVES.
HARGREAVES, BROS. & CO.
BENJN. HARGREAVES.
&c. &c. &c.

Lancaster.

The humble Petition of the Inhabitants of the Borough of Lancaster and its neighbourhood,

Sheweth,

That your Petitioners are convinced that the adoption of a system of decimal coinage would be of great service in all trading transactions, and of benefit to all classes of the community.

Wherefore your Petitioners humbly pray,

That your honourable House will be pleased at the earliest possible period to pass such enactments as in your wisdom you shall see fit to legalise the immediate use of a decimal coinage.

And your Petitioners, as in duty bound, will ever pray.

JOHN S. BURRELL, Mayor.
JOHN ARMSTRONG, J.P.
T. FAULKNER LEE, M.A., Head Master of Royal Grammar School.
&c. &c. &c.

American Chamber of Commerce.

The humble Petition of the President and Members of the American Chamber of Commerce of Liverpool,

Sheweth,

That your Petitioners are engaged in trade with the United States of America, and from experience can bear testimony to the advantages arising from the adoption of a decimal system of coinage and accounts in that country,—benefits which must be enjoyed by every nation using that system.

That your Petitioners learnt with much satisfaction that in the last Session of Parliament your honourable House appointed a Committee to inquire how far a decimal coinage could be adopted with advantage in the United Kingdom, or whether any difficulties presented themselves to render it inexpedient.

That, from the Report of that Committee, agreed to after hearing the evidence of many intelligent witnesses in various pursuits in life, it appears that the adoption of such a system in this country would be advantageous, and that there is no practical difficulty in carrying it into effect; that it would save time in the education of youth; simplify and decrease the chances of error in accounts, public or private; materially aid engineers, architects, and men of science in difficult and laborious calculations; and benefit all classes of Her Majesty's subjects:—and, on these and other grounds, the Committee strongly recommend the adoption of the system.

Your Petitioners, deeply feeling the cogency of these reasons, and the important benefits to be derived from this system, humbly pray that the same may be established in this country with the least possible delay.

And your Petitioners will ever pray, &c.

Wm. Barber, President.

Blackburn.

The humble Petition of the Mayor, Aldermen, and Burgesses of the borough of Blackburn, in the county of Lancaster,

Sheweth,

That, in the opinion of your Petitioners, the adoption of a decimal system of currency would greatly simplify accounts and all monetary transactions, and would therefore much facilitate the commerce of the country.

Your Petitioners therefore humbly pray that your honourable House will take the subject into your consideration, and enact such a measure as in your judgment may be most expedient.

Thos. Dugdale, Mayor.

Dundee.

The Petition of the Chairman, Vice Chairman, and Directors of the Dundee Chamber of Commerce,

Humbly sheweth,

That your Petitioners, considering that any measure which will tend to simplify accounts, render mistakes less frequent, and abridge the time necessary for education, will be of great value, have learned with much satisfaction that a Committee of your honourable House was appointed last Session to take evidence as to the advantages that would arise from having a decimal system of coinage, and that the Committee so appointed, after examining many intelligent witnesses, unanimously and most urgently recommended its immediate adoption.

Your Petitioners, therefore, believing it would confer a great boon, not only on the country, but upon all classes universally and without exception, most respectfully urge its being carried into effect with the least possible delay, and in such manner as may seem best to the wisdom of Government.

And your Petitioners will ever pray.

Signed on behalf of the Chairman, Vice Chairman, and Directors of the Dundee Chamber of Commerce, by

James Neish, Chairman.

Bolton.

The humble Petition of the Mayor, Aldermen, and Burgesses of the borough of Bolton, under their common seal,

Sheweth,

That they have seen with great satisfaction the Report of a Committee of your honourable House, generally known as the Decimal Coinage Committee, and most fully concur in the plan it has suggested and recommended for the establishment of a system of a decimal coinage, the simplicity of which over that now in use, your Petitioners believe, would be of great advantage in abridging the time now necessary for the instruction of youth in the knowledge of arithmetic, and would be of great service in facilitating the commercial operations of the country.

Your Petitioners therefore humbly pray that your honourable House will lose no time in passing a law for the establishment of such a system.

And your Petitioners will ever pray.

P. R. Arrowsmith, Mayor.

No. 8.
Petitions to House of Commons.

Ayr.

The humble Petition of the Provost, Magistrates, and Town Council of the royal burgh of Ayr, Scotland,

Sheweth,

That your Petitioners consider that the adoption of a decimal coinage would be a great public benefit, both in an educational and commercial point of view.

Your Petitioners therefore humbly pray that your honourable House will be pleased to take the matter of decimal coinage into your consideration, and adopt such measures as may be necessary for passing the same into a law.

And your Petitioners shall ever pray.

Signed by the Provost at the council table, in our name and by our authority, and the seal of the corporation attached hereto, this thirteenth day of February, one thousand eight hundred and fifty-four years,

HUGH MILLER, Provost.

Waterford.

The Petition of the Managing Committee of the Waterford Mechanics' Scientific Institute,

Sheweth,

That your Petitioners are charged with the management of an educational establishment, and are therefore deeply interested in the success of every measure tending to facilitate the business of education; that they regard the adoption of a decimal system of coinage, and of accounting in money transactions, as recommended by the Committee of your honourable House, as a step eminently calculated to promote this important object.

Your Petitioners therefore respectfully but earnestly crave that it may please your honourable House to take the Report presented during the last Session of Parliament by the Select Committee on Decimal Coinage into your early consideration, and to adopt such measures in reference thereto as may in your judgment seem most fit for giving speedy effect to their valuable recommendations, and for thus securing to the country a system of accounting the benefits of which must be felt by all classes of the people, and especially by those who can least afford to give the time necessary for the instruction of their children even in the elementary branches of knowledge.

And your Petitioners, as in duty bound, will ever pray.

Signed on behalf of the Waterford Mechanics' Scientific Institute, by order,

JOHN G. DAVIS, Secretary.

Waterford, 17 Feb. 1854.

Aberdeen Corporation.

The humble Petition of the Provost, Magistrates, and Council of the city of Aberdeen,

Sheweth,

That, as the decimal system of coinage and of accounts affords greater facility, and is more clear, simple, and correct than that at present in use in this country, it is of great importance to the interests of trade and commerce that it should be adopted.

That such a system will abridge the labour of the master in teaching and the scholar in learning arithmetic; it will simplify all monetary transactions to the humblest person in the country, as well as to the more wealthy; it will afford advantages in vending the products of our industry in the various markets of the world, where we have to meet competition, and enable engineers, contractors, men of science, and all parties engaged in similar pursuits, to perform with more ease, correctness, and satisfaction the complicated calculations which frequently devolve upon them.

That a decimal system of coinage has been recommended in a most decided manner by the Committee of your honourable House appointed last Session.

Your Petitioners humbly pray that it may please your honourable House to adopt such measures as shall appear to be necessary and expedient for carrying a system of decimal coinage into effect in this country.

And your Petitioners will ever pray.

Signed in name and by appointment of the Provost, Magistrates, and Council of the city of Aberdeen, and the common seal of said city hereunto affixed, at Aberdeen, the fourteenth day of February, in the year one thousand eight hundred and fifty-four,

JNO. BLACKIE, Provost of Aberdeen.

Hereford Corporation.

The humble Petition of the Mayor, Aldermen, and Councillors of the city of Hereford, in council assembled,

Sheweth,

That simplicity in the names and divisions and value of the coins of the realm would greatly facilitate the rapid transaction of business, and is therefore essential to the developement of the physical resources of this great commercial country.

That the names, divisions, and values of the present coins do not fulfil this requirement, but on the contrary are indescriptive, complicated, and inconvenient.

That a decimal coinage, with names, divisions, and values all in harmony, would in a great degree attain the desired object.

That the decimal coinage recommended by the Parliamentary Committee of the last Session should be forthwith adopted; inasmuch as it proposes to divide decimally the pound sterling or sovereign into 1,000 mils; the half sovereign into 500 mils; the florin into 100 mils; the shilling into 50 mils; and the sixpence into 25 mils; and the copper coins into 1, 2, and 5 mil pieces.

That a coinage thus decimalized in name, division, and value, bearing simple relations in all its parts, would quickly be popularly understood and its advantages appreciated, not only by men of business, but likewise by all other classes; and these advantages would be so obvious and manifold, that the public would soon desire to see the decimal principle not only applied to weights and measures, but also extended to the use of figures in every kind of arithmetic.

Your Petitioners therefore humbly pray that your honourable House will take the premises into your earliest possible consideration, with a view to the speedy adoption of a decimal coinage in gold, silver, and copper, for the use of these realms.

And your Petitioners, as in duty bound, will ever pray.

Given under the corporate common seal of the said city, at the council chamber in the guildhall of the said city, the second day of February, one thousand eight hundred and fifty-four,

CHARLES ANTHONY, Mayor.

Bradford Chamber of Commerce.

The humble Petition of the Bradford Chamber of Commerce,

Sheweth,

That your Petitioners are of opinion that the introduction of a decimal system for accounts and currency would be of much advantage to the community at large.

That your Petitioners are of opinion that it would not be desirable to disturb the existing habits and customs of the people by the alteration of the names or weights of coins further than is essential for the complete adoption of the decimal system, and that by making the present sovereign the unit this end would be readily accomplished.

Your Petitioners therefore humbly pray that your honourable House will be pleased at the earliest possible period to consider the question of a decimal currency, with a view to its immediate adoption in the United Kingdom.

And your Petitioners will ever pray, &c.

WM. RAND, President.
JOHN DARLINGTON, Secretary.

Dundee Corporation.

The humble Petition of the Magistrates and Town Council of the royal burgh of Dundee,

Sheweth,

That it appears to your Petitioners that any measure calculated to simplify accounts and to render more easy and expeditious the transacting of the extensive and multifarious commercial affairs of this country would be of incalculable advantage, especially to the commercial community of these kingdoms.

That the Petitioners have learned with considerable satisfaction that a Committee of your honourable House, appointed during last Session, after taking evidence as to the advantages that would accrue, especially to commerce, by the adoption of a decimal system of coinage, have been pleased unanimously to recommend the adoption of the measure.

The Petitioners, humbly concurring in the views of the honourable Committee, respectfully and urgently pray your honourable House to take the necessary measures for the adoption as early as possible of a decimal system of coinage, in such way as may appear best in the wisdom of your honourable House.

And your Petitioners will ever pray.

Signed in name and by authority of the Magistrates and Council of Dundee, and the common seal of the said burgh hereunto affixed, at Dundee, the twenty-fourth day of February, eighteen hundred and fifty-four years,

GEO. WAUGH,
Provost and Chief Magistrate of the royal burgh of Dundee.

Falmouth Corporation

The humble Petition of the Mayor, Aldermen, and Burgesses of Falmouth,

Sheweth,

That, after full consideration of the subject, your Petitioners are fully convinced that great advantage would result from the adoption of a system of decimal coinage.

Your Petitioners therefore humbly pray that your honourable House will be pleased, at the earliest practicable period, to pass such measures as will secure to the community the advantage of such a system.

And your Petitioners, as in duty bound, will ever pray.

Given under the common seal of the borough of Falmouth, in the county of Cornwall, the twenty-second day of February, 1854,

W. J. GENN, Town Clerk.

No. 8.
Petitions to House of Commons.

Derby Mechanics' Institute.

The humble Petition of the Managing Committee of the Derby Mechanics' Institution,
Sheweth,

That the Parliamentary Committee's Report of last Session to your honourable House, on the grounds there set forth, strongly recommended the adoption of a system of decimal coinage, which has been followed by an order of the Committee of Council on Education, instructing their inspectors of training schools to call the attention of schoolmasters to instruct their pupils on the subject; and, as your Petitioners are aware of the great national importance of a decimal system of coins, they humbly pray that no time may be lost in giving them a decimal coinage.

And your Petitioners will ever pray.

On behalf of the Managing Committee of the Derby Mechanics' Institution,
RICHARD STONE, Chairman.

February 25th, 1854.

Liverpool Mechanics' Institute.

The Petition of the Directors of the Liverpool Mechanics' Institution,
Sheweth,

That your Petitioners are charged with the management of an establishment in which from fourteen to fifteen hundred pupils are receiving instruction; that they are therefore deeply interested in the success of every measure tending to facilitate the business of education; and that they regard the adoption of a decimal system of coinage, and of accounting in money transactions, as recommended in the Report by the Committee of your honourable House, as a step eminently calculated to promote this important object.

Your Petitioners therefore respectfully but earnestly crave that it may please your honourable House to take the Report presented during the last Session of Parliament by the Select Committee on Decimal Coinage into your early consideration, and to adopt such measures in reference thereto as may, in your judgment, seem most fit for giving speedy effect to their valuable recommendations, and for thus securing to the country a system of accounting, the benefits of which must be felt by all classes of the people, and especially by those who can least afford to give the time necessary for the instruction of their children even in the elementary branches of knowledge.

And your Petitioners, as in duty bound, will ever pray.

Signed in name and on behalf of the board of directors,
R. W. RONALD, Vice-President.

31st January 1854.

Southport.

The humble Petition of the Inhabitants of Southport and neighbourhood,
Sheweth,

That they have seen with great satisfaction the Report of a Committee of your honourable House, generally known as the Decimal Coinage Committee, and most fully concur in the plan it has suggested and recommended, of taking the pound sterling as the unit of account.

They consider this of much importance, as their rents, leases, and engagements have reference to the sovereign, and any disturbance of it would cause great embarrassment.

The simplicity of a decimal system over that now in use, in abridging the time necessary for the instruction of youth in obtaining a more perfect knowledge of arithmetic, and with advantage to the commercial interests of the country, is a consideration of so much importance, your Petitioners humbly pray that your honourable House will lose no time in passing such laws as will secure this boon to the United Kingdom.

And your Petitioners, as in duty bound, will ever pray.

JAMES GLOVER, J. P.
BENJ. S. CLARKE, B. A.
SAMUEL LEES, J. P.
&c. &c. &c.

Society of Actuaries.

The humble Petition of the Council and Members of the Institute of Actuaries,
Sheweth,

That your Petitioners, in the practice of their profession, are principally employed in calculations requiring great accuracy as well as expedition, very extensive and important pecuniary transactions being founded thereon.

That your Petitioners invariably adopt the decimal division of the pound sterling in such calculations, most of which are so complicated that to perform them by the present legal division of the pound into shillings, pence, and farthings, would occasion such additional labour, as to render them almost impracticable.

Thst your Petitioners have given great attention to the Report presented to your honourable House by a Committee appointed to consider the question of decimal coinage, and your Petitioners entirely concur in the opinion of such Committee, and of the several eminent persons who gave evidence before them, that if the coinage of the empire were

based upon a decimal system it would have a most beneficial effect in simplifying calculations, and would facilitate commercial transactions, as well as the acquirement of arithmetical knowledge; and your Petitioners are further of opinion that many additional advantages not referred to in the Report of the Committee of your honourable House, and which do not appear to have been suggested in the evidence laid before them, would thereby accrue, particularly in the construction and use of tables for assisting in numerical operations.

That, impressed with these convictions, your Petitioners have carefully considered the various plans for the introduction of a decimal coinage suggested to the Committee of your honourable House, as well as many others that have been published, and your Petitioners are decidedly of opinion that the plan recommended by the Committee is the best that has been devised.

That your Petitioners are convinced that the inconvenience apprehended as likely to arise from the proposed change will be much less than is generally imagined, and that it will be found in reality very slight when compared with the great advantages to be derived from its adoption.

Your Petitioners therefore humbly pray that your honourable House will be pleased to pass, as speedily as may be convenient, such measures as may be necessary to carry the recommendations of the Committee into effect.

And your Petitioners, as in duty bound, will ever pray.

SAMUEL BROWN,
JOHN HILL WILLIAMS, } Honorary Secretaries.

Arbroath.

The humble Petition of the Provost, Magistrates, and Members of the Town Council of the royal burgh of Arbroath,

Sheweth,

That your Petitioners understand that a Committee of your honourable House reported unanimously in favour of the adoption of a system of decimal coinage for the United Kingdom, and the public voice has very generally confirmed the soundness of that report.

That your Petitioners believe that a system of decimal coinage such as that recommended for adoption would prove highly advantageous in simplifying accounts, and affording greater facilities in all monetary transactions in the United Kingdom, while at the same time the introduction of that system may be made without leading to any serious derangements of the currency of the country.

Therefore your Petitioners humbly pray that your honourable House will be pleased to adopt and legalise a uniform system of decimal coinage for the United Kingdom.

And your Petitioners, as in duty bound, will ever pray.

Signed in name and by appointment of the Magistrates and Town Council of Arbroath, and the common seal of the borough hereunto affixed, by

ROB. LYON, Provost.

Manchester Chamber of Commerce.

The Petition of the Directors of the Chamber of Commerce and Manufactures of Manchester,

Sheweth,

That on the 25th of March, 1852, your Petitioners addressed a Memorial to the Lords of the Treasury praying that measures might be taken by Her Majesty's Government for adapting forthwith the whole of our coinage to a system of decimal proportions, and for making immediate preparation for an eventual application of the same system to weights and measures at the earliest practicable period.

That subsequent consideration has confirmed the conviction that many important advantages would arise from the adoption of such a system, and your Petitioners therefore saw with great satisfaction that your honourable House in the last session appointed a Select Committee to investigate the subject.

That your Petitioners concur in the recommendation of that Committee, and would gladly see your honourable House adopt at once some measure for giving legislative effect to it, in such manner as to the wisdom of your honourable House may seem most meet, but retaining the £ sterling as the integer.

That your Petitioners wish to record before your honourable House their dissent from a proposition which they have seen advocated, that, before entering upon a change of system in this country, an attempt should be made, by conference or negotiation, to fix upon a standard of value which shall be applicable to all nations. Your Petitioners believe such an idea to be chimerical, and, even if possible, most unadvisable as regards money, inasmuch as this country could not have any reliable security that other countries would adhere, for a single year, to the standard agreed upon.

That our existing gold and silver coins afford a singular facility towards making the desired change without cost or loss to the country, inasmuch as although it would be desirable to consult public convenience in future coinages, and the threepenny and fourpenny pieces lose much of their usefulness, yet none of them would require immediate replacement; but it does appear to your Petitioners to be absolutely necessary that, simultaneously with the change, the whole of our copper coinage should be remodelled, and

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made to represent such proportionate values of the integer as may be found most useful in preventing those losses from fractional differences which would otherwise be made to fall upon retail small purchases.

Your Petitioners therefore humbly pray that your honourable House may forthwith apply itself to this question, and pass such a measure as may, as soon as practicable, adapt the whole of our coinage to a system of decimal proportions, and provide for an early application of the same system to the weights and measures of these kingdoms.

And, as in duty bound, they will ever pray.

By order and on behalf of the Directors of the Chamber of Commerce and Manufactures at Manchester,

THOS. BAZLEY, President.

Manchester, March 21st, 1854.

Oxford Corporation.

The humble Petition of the Mayor, Aldermen, and Citizens of Oxford, in common council assembled,

Sheweth,

That your Petitioners learn with great satisfaction that the Committee appointed by your honourable House to consider the propriety of adopting a decimal coinage have unanimously recommended your honourable House to sanction the adoption of a plan set forth in their report.

And your Petitioners, fully approving of the principle of a decimal coinage, humbly pray that your honourable House will be pleased, at the earliest possible period, to pass a law to carry the same into effect.

And your Petitioners, as in duty bound, will ever pray, &c.

Given under our common seal the fourteenth day of March, in the year of our Lord one thousand eight hundred and fifty-four.

(Seal.)

Dalkeith Scientific Convention.

The humble Petition of the Dalkeith Scientific Association,

Sheweth,

That your Petitioners, impressed with the advantages likely to arise from the adoption in this country of a decimal system of coinage and accounts, beg leave respectfully to suggest to your honourable House the propriety of taking measures for the introduction and establishment of such a system. That your Petitioners consider the coinage presently in use as unfavourable alike to the interests of education and of general business, as entailing a vast amount of unnecessary labour, involving great liability to errors of computation, and rendering the statement and calculation of accounts needlessly complex and difficult. That the introduction of a decimal system would, as your Petitioners believe, lead to greater accuracy, diminish the labour of calculation to a large extent, and facilitate the business of education, by the introduction into schools of a system so directly calculated to render easy the acquirement of arithmetic. That, entertaining these views, your Petitioners observed with much satisfaction the appointment by your honourable House, during last Session of Parliament, of a Select Committee, to consider and report on the subject of decimal coinage, and, having perused the Report of that Committee, with the minutes of the evidence on which it is founded, your Petitioners are confirmed in their opinions in regard to the desirableness of making arrangements for the early introduction of a decimal system of coinage and accounts.

May it therefore please your honourable House to adopt such measures as to your wisdom may seem best for carrying into effect the recommendations of the Select Committee, by providing for the early and universal adoption in this country of a decimalised system of coinage.

And your Petitioners will ever pray.

ROB. SCOTT MONCRIEFF, Chairman.

Dalkeith, 15th March 1854.

Dumfries.

The humble Petition of the Provost, Magistrates, and Town Council of the royal burgh of Dumfries,

Sheweth,

That the Petitioners, observing the interest taken by the public, and particularly by the inhabitants of large commercial towns, in the advantages and importance attached to the subject of a decimal system of coins, weights, and measures,—especially of our currency,—and believing that such system will greatly abridge the labour of teaching and learning arithmetic, simplifying accounts in the settlement of all monetary transactions, and materially decreasing errors in calculations, are of opinion that the time is now arrived when a change should be adopted in this kingdom.

That your Petitioners understand the subject has already been before Parliament, and that much valuable evidence has been obtained under the Commissions issued by your honourable House; and that the information so obtained warrants your Petitioners to approach you on the subject, and to beg your earnest and immediate attention to securing

the desired change by a Legislative Act, particularly in regard to our coinage, so that this country may obtain the mighty advantages already secured by numerous nations in close and constant connection with this country in commercial business.

And your Petitioners will ever pray.

Signed in name and by authority of the Magistrates and Town Council of the royal burgh of Dumfries, in common council assembled, and seal of the said burgh is hereunto affixed, the seventh day of April, eighteen hundred and fifty-four years,

MILES LEIGHTON, Provost.

Liverpool Guardian Society for the Protection of Trade.

The humble Petition of the Liverpool Guardian Society for the Protection of Trade, consisting of upwards of one thousand eight hundred persons, being bankers, merchants, and traders,

Sheweth,

That your Petitioners, from the nature of their avocations, are deeply interested in any change having a tendency to facilitate mercantile and trading intercourse, and especially having a tendency to simplify the monetary accounts in which your Petitioners are daily engaged.

That your Petitioners have learnt with great satisfaction that the Select Committee of your honourable House appointed to take evidence and report upon the practicability of adopting a better system of national coinage, have unanimously recommended the adoption of the decimal system of coinage, having for its integer the present pound sterling.

That, in the opinion of your Petitioners, the adoption of a decimal system of coinage is eminently calculated to lessen the errors inseparable from the present system of accounting, will greatly abridge the labour required for a more perfect system of book-keeping, and economise the time of all engaged therein.

That by the decimal system the arithmetical education of the rising generation will be greatly facilitated, the labour of the teachers will become less onerous, and the time of both teacher and pupil much abridged.

That your Petitioners are glad to find that the Committee of Council on Education have recognised the value of the decimal system of coinage, inasmuch as they have directed the inspectors of training schools to call the attention of the schoolmasters to the subject of the instruction of their pupils therein.

That your Petitioners anticipate no difficulties in carrying out the decimal system of coinage but what may be easily overcome; that the benefit to be derived by all classes from its adoption will much more than compensate any temporary inconvenience arising from the change; that as the system gradually develops itself to the minds of the industrial population all objections to the change will disappear, and the transition from the present imperfect and difficult system to the system recommended in the Report of your Select Committee will be universally accepted as an invaluable boon conferred upon the present and extended to future generations.

Your Petitioners, fully impressed with the value and importance of a decimal system of coinage, humbly pray that your honourable House will be pleased to take such immediate steps for giving effect to the Report of your Select Committee, by the introduction of a decimal system of coinage into the monetary transactions of the kingdom, as to your honourable House may seem meet.

And your Petitioners, as in duty bound, will ever pray.

WILLIAM MCMILLEN, President.

Manchester Corporation.

The humble Petition of the Mayor, Aldermen, and Citizens of the city of Manchester, in the county of Lancaster, in council assembled on the 19th day of April, 1854,

Sheweth,

That a Select Committee of your honourable House, appointed in the last Session of Parliament to consider and report on the practicability and probable effect of adopting a decimal system of coinage, having, on the convincing facts and reasonings set forth in their Report, strongly urged the introduction of such a system into this country; and the Committee of Council on Education, in furtherance, it is presumed, of this recommendation, having directed the inspectors of training schools to give particular attention to the instruction of scholars in decimal arithmetic, your Petitioners, deeming a decimal system of coins, weights, and measures of great national importance, are encouraged by the circumstances to which they have referred to state their approbation of the system, and humbly to pray your honourable House to apply it with the least possible delay to the coinage of the realm, having every confidence that an experience of its advantages in that respect will lead to its adoption hereafter as applied to weights and measures.

And your Petitioners will ever pray, &c.

(Seal.)

Liverpool.

The Petition of the undersigned Inhabitants of Liverpool,

Humbly sheweth,

That, setting a high value upon any measure that will simplify accounts, render mistakes less frequent, abridge the time necessary for education, and save labour to both master and

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scholar, your Petitioners have learned with great satisfaction that a Committee of your honourable House was appointed last Session to take evidence as to the advantages that would arise from having a decimal system of coinage; and that the Committee so appointed, after examining many intelligent witnesses, unanimously and most urgently recommended its immediate adoption.

Your Petitioners, therefore, considering that it would confer a great boon not only on the country, but upon all classes universally and without exception, most respectfully urge its being carried into effect, as to the wisdom of government may seem best, with the least possible delay.

And your Petitioners will ever pray.

F. Shand, President of the Liverpool Chamber of Commerce.
Thomas Bouch, Vice-President.
Edward Heath.
&c. &c. &c.

Gateshead and Newcastle Trade Protection Society.

The Petition of the Newcastle and Gateshead Trade Protection Society,

Humbly sheweth,

That the society is composed of upwards of 500 manufacturers, merchants, and traders, carrying on business in Newcastle and Gateshead and neighbourhoods.

That your Petitioners, being deeply interested in any change a having tendency to facilitate mercantile and trading intercourse, have learnt with satisfaction that the Select Committee of your honourable House, appointed to take evidence and report upon the practicability of adopting a better system of national coinage, have unanimously recommended the adoption of the decimal system.

That your Petitioners anticipate no difficulties in carrying out the decimal system of coinage but what may be easily overcome, and that the benefit to be derived by all classes from its adoption will more than compensate any temporary inconvenience arising from the change; that, as the system gradually develops itself to the minds of the industrial population, all objection to the change will disappear, and the transition from the present imperfect and difficult system will be universally accepted as an invaluable boon conferred upon the present and extended to future generations.

Your Petitioners, impressed with the value and importance of a decimal system of coinage, humbly pray that your honourable House will be pleased to take such immediate steps for giving effect to the Report of your Select Committee as to your honourable House may seem meet.

And your Petitioners, as in duty bound, will ever pray.

Signed for and on behalf of the society,

Daniel Oliver, Chairman.

London Trade Protection Society.

The humble Petition of the London Trade Protection Society, 170, Regent Street, consisting of upwards of one thousand five hundred members, being bankers, merchants, traders, and others,

Sheweth,

That your Petitioners are greatly desirous of effecting some change which may render more easy and expeditious trading and other intercourse, and particularly so as respects accounts in money.

That your Petitioners have been informed that the Select Committee of your honourable House, appointed to take evidence and report upon the feasibility and propriety of using a different system of coinage, have advised the using of the decimal system, the pound sterling being its integer.

That your Petitioners have no doubt that by adopting a decimal system of coinage, there would be far less difficulty in accounting, less labour required in bookkeeping, and that a great deal of the time of all so occupied would be saved.

That by the use of the decimal system arithmetic would become more simple, easier of attainment, and far less likely to be forgotten.

That your Petitioners know that the Committee of the Council on Education approve of the decimal system of coinage, and have taken steps to cause instruction to be given therein.

That your Petitioners see little difficulty in carrying the decimal system of coinage into effect, and that in the present day, with the knowledge generally possessed by the industrial classes, they would soon become reconciled to and approve of the system recommended in the Report of your Select Committee.

Your Petitioners, knowing the advantages of a decimal system of coinage, humbly pray that your honourable House will be pleased to proceed as early as possible to carry into effect the Report of your Select Committee, by introducing a decimal system of coinage into the pecuniary transactions of Great Britain and Ireland, as to your honourable House shall seem meet.

And your Petitioners will ever pray, &c.

Peter Graham, Chairman.

15th June, 1854.

Liverpool Archæological Society.

This Petition of the undersigned Members of the Liverpool Architectural and Archæological Society,

Humbly sheweth,

That your Petitioners have learnt with much satisfaction that the attention of your honourable House has been directed to the revision of the anomalous system upon which the coinage, weights, and measures of this country are at present based, as they have frequent experience of the great inconvenience which is thereby occasioned in land surveying, in the measurement and valuation of artificers' work, and in the application of science to practical architecture and construction.

That your Petitioners find that the present system, or rather the absence of any system which now prevails, renders all extensive calculations cumbrous, unnecessarily laborious, and liable to error: to so great an extent are these inconveniences experienced, that many of your Petitioners endeavour to simplify the process by the reduction of existing denominations to decimals, which, after the calculations are completed, are restored to the original form; and your Petitioners humbly submit that this is very strong evidence that the present arrangements of coinage, weights, and measures is highly objectionable, and quite unworthy of a commercial nation.

That your Petitioners have occasionally to compare English with foreign coins, weights, and measures, some of which are arranged on a decimal basis, and in the increasing intercourse between this and other countries it seems very desirable that all useless impediments to freedom in that intercourse should be removed with as little delay as possible, and that efforts should be made to establish an unity of denomination with the more important of other nations, to serve as a standard in the conversion of the moneys, weights, and measures of one country into those of any other.

Your Petitioners therefore humbly but earnestly pray that your honourable House will be pleased to promote the requisite proceedings for securing the great boon of the decimal system to this country.

And your Petitioners, as in duty bound, will ever pray.

Charles Verelst, President.
John Hay, Vice-President.
Fras. Homer, Treasurer.
&c. &c. &c.

Society of Arts.

The humble Petition of the Society for the Encouragement of Arts, Manufactures, and Commerce,

Sheweth,

That there are at present time in union with the society 357 of the literary and scientific institutions and mechanics' institutes throughout the United Kingdom.

That, at a conference of the representatives of these institutions with the council of this society, held at the society's house on the 4th day of July instant, the following resolution amongst others was unanimously passed.

"That this conference earnestly desires an early adoption of the decimalisation of weights, measures, coins, and accounts."

That your Petitioners entirely concur in the views expressed in the foregoing resolution.

Your Petitioners therefore pray that your honourable House will please to take measures for a speedy introduction into the United Kingdom of a decimal system of weights, measures, coins, and accounts.

And your Petitioners will ever pray.

Ebrington, Chairman of the Council.

Session 1854–5.

Liverpool Chamber of Commerce.

The Petition of the Liverpool Chamber of Commerce,

Humbly sheweth,

That on the 11th day of November, 1852, their president addressed a letter to the right honourable the President of the Board of Trade stating that they felt the great importance of adopting a decimal currency, and most respectfully calling his attention to the subject, and saying that it would greatly facilitate all calculations in keeping accounts, would save labour, and decrease the chances of mistakes, and that since the florin had come into circulation its adoption would be greatly facilitated. They further remarked that it was not desirable to disturb the existing habits of the people by altering the names or weights of coins further than is essentially necessary to the adoption of a complete decimal system.

Since the letter above alluded to was written, much discussion has taken place through the press as to what would be the most desirable unit to adopt. Your Petitioners see no reason whatever to alter their views of the pound sterling being the unit which would be

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productive of the least disturbance and greatest advantage. When your Petitioners' opinion on this important subject was given, they were not aware of the two Royal Commissions, who strongly recommended the pound sterling unit, and the Decimal Coinage Committee of your honourable body was not then appointed, but which has since made a Report strongly corroborative of the opinion of this chamber.

Your Petitioners therefore pray that no time may be lost in carrying the recommendation of the Royal Commissions and the Committee of your honourable House into effect, and which will confer an important and lasting benefit on the nation.

And your Petitioners will ever pray.

Signed on behalf of the Liverpool Chamber of Commerce,

THOMAS BOUCH, President.

Ballymena.

The humble Petition of the undersigned Inhabitants of Ballymena and the neighbourhood,

Sheweth,

That a Report of a Committee of your honourable House clearly points out the advantages that would arise in the education of the people from a decimal system of coinage, as recommended by them; as it would lessen the time necessary for the education of youth. Every step taken in this direction is of national importance.

We therefore pray that no time may be lost in carrying out their suggestion; and also that of decimalizing our weights and measures.

And your Petitioners, as in duty bound, will ever pray.

WM. GIHON & SONS.
JAS. & ROBT. YOUNG.
JAS. YOUNG & CO.
&c. &c. &c.

Dated at Ballymena, the 30th day of January, 1855.

Warrington Corporation.

The humble Petition of the Mayor, Aldermen, and Burgesses of the borough of Warrington,

Sheweth,

That your Petitioners highly approve of the recommendation of a decimal coinage made by two Royal Commissions and by a Committee of your honourable House.

Your Petitioners therefore pray your honourable House that no time may be lost in carrying that recommendation into effect.

And your Petitioners, as in duty bound, will every pray, &c.

Sealed with the common seal of the said borough by order of the council,

JNO. F. MARSH, Town Clerk.

Liverpool Metal Brokers.

The humble Petition of the undersigned Iron Merchants and Metal Brokers of Liverpool,

Sheweth,

That your Petitioners have had under consideration the desirableness of an alteration of our system of currency to a decimal system.

That your Petitioners are firmly persuaded that it would be the means of a great saving of time and labour in keeping their accounts, and that it would, by its simplicity, prevent the commission of many errors.

Your Petitioners believe that a change to a decimal coinage can be easily carried into operation, and will not be productive of any inconvenience to any portion of the population, except the little which may arise while the change is being carried into effect.

Your Petitioners approve the plan for a decimal coinage which retains the sovereign or pound sterling in its integrity, by which all disturbance of our monetary relations with other countries will be avoided; and they submit that a decimal coinage should be effected by the division of the sovereign into 1,000 parts or mils, in accordance with the recommendation of a Committee of your honourable House, and of two Royal Commissions.

Your Petitioners therefore pray your honourable House that no time may be lost in carrying the above recommendations into effect.

And your Petitioners, as in duty bound, will ever pray, &c.

WILLIAMS, PARK, and Co.
WILLIAM FOX and SON.
MORECROFT and EDGCOMBE.
&c. &c. &c.

Liverpool, 17th March, 1855.

Bewdley.

The humble Petition of Inhabitants of Bewdley and the Neighbourhood,

Sheweth,

That your Petitioners experience great inconvenience from the present system of keeping accounts, by reason of the pound sterling being divided and subdivided into shillings, pence, and farthings.

That your Petitioners find that the decimal system of keeping accounts is much preferable to that now in use, not only on account of its simplicity, but inasmuch as great time and trouble would be thereby saved, and the liability to error much lessened.

That the decimal system cannot be adopted advantageously without the pound sterling is divided into 10 florins as at present, but also each florin divided into a coin of 1-10th its value, and that coin subdivided into another coin of 1-10th its value, such last-mentioned coin being equivalent to our present farthing, within 4 per centum.

That in order to bring the decimal system into use, none of the present coins need be withdrawn from circulation, except the fourpenny piece; but, for convenience, it would be better if the half-crown and threepenny pieces were withdrawn also; and the copper penny constituted of the value of five farthings.

Your Petitioners therefore pray your honourable house that no time may be lost in carrying this into effect.

And your Petitioners will ever pray, &c.

SLADE BAKER, Justice of the Peace for the County of Worcester.
C. P. BANCKS, Mayor.
JOHN BEDDOE, Justice.
&c. &c. &c.

Sheffield Corporation.

The Petition of the Mayor, Aldermen, and Burgesses of the borough of Sheffield, in the county of York, in council assembled,

Sheweth,

That your Petitioners are of opinion that the present system of coinage used in this country is cumbersome, inconvenient, and intricate, and that it would be of great advantage in all monetary transactions if the decimal system were adopted in the place of the present complicated system.

Wherefore your Petitioners pray that your honourable House will be pleased, at the earliest opportunity, to take such measures as to your honourable House shall seem expedient to introduce a decimal coinage, by means of which the monetary transactions of the country may be more readily carried on, and the inconvenience of the existing system be obviated.

And your Petitioners will ever pray, &c.

WILLIAM FISHER, Jun. Mayor.

Irvine.

The Petition of the undersigned Inhabitants of the royal burgh of Irvine,

Humbly sheweth,

That your Petitioners, believing that the introduction of a decimal coinage would be of great advantage to the country, inasmuch as it would simplify an important branch of education, and facilitate the keeping of accounts and commercial transactions, are desirous of seeing such a coinage introduced.

Your Petitioners think that the hundredth part of a pound should not be called a cent, that name being already appropriated to an American coin of a different value. They are also of opinion that the name farthing should be retained for the thousandth part of a pound.

May it therefore please your honourable House to take measures for the introduction of such a coinage.

And your Petitioners will ever pray.

THOS. CAMPBELL.
JOHN GILFILLAN.
W. M'FARLANE.
&c. &c. &c.

Banbury Corporation.

The humble Petition of the Mayor, Aldermen, and Burgesses of the borough of Banbury, in the county of Oxford,

Sheweth,

That the adoption of a decimal or simple arithmetic system of coins, weights, and measures would save a large amount of labour in the daily business of banks and mercantile establishments, and would greatly diminish the liability to error in all calculations of quantities and value.

That there is no practical difficulty in the way of the immediate establishment of a decimal system of coins and accounts.

That the first step to such a system has been already taken by the issue of the florin, marked one-tenth of a pound.

That to complete the system there is only required the issue of two new coins—a silver coin to be called a cent, and to be stamped one-tenth of a florin, and a copper coin to be called a mil, to be stamped one-tenth of a cent.

That the introduction of this system does not require any change in our existing gold coins.

No. 8. Petitions to House of Commons.

That the pound would still continue to be the first coin of account.

That the half-sovereign would remain, as now, a coin of change for the pound.

That the shilling, important for its use in quotations of prices and wages, would also remain a coin of change.

That the sixpence would remain, and would be important in change as the half-shilling.

That your Petitioners are of opinion that any other mode of decimalizing our currency than from the pound downward to the mil is altogether impracticable.

That the pound constitutes an English national fixed idea of value and position, and is associated with every existing contract, and every comparison of past revenue, expenditure, and price, and must be retained.

That the decimalization of our coinage from the pound has the support of the highest scientific and commercial authorities.

That its importance has been urged upon successive Governments by the Royal Commissions of 1838 and 1843, and by the Committee of your honourable House in 1853.

That America, France, and nearly the whole of the nations of Europe have already adopted decimal systems of money and accounts.

That, whatever changes have been made in the gold, silver, or other coins of those countries, there has in no instance, been any departure from the proved convenience of the decimal system.

Your Petitioners, therefore, humbly pray that your honourable House will be pleased to take such course as may lead to the early issue of the required coins to complete the decimal system of moneys of accounts from the pound.

And your Petitioners, as in duty bound, will ever pray.

Done at a meeting of the Council of the borough of Banbury, held the 7th day of April, 1855,

RICHARD GOFFE, Mayor.

Durham Corporation.

The humble Petition of the Mayor, Aldermen, and Citizens of the city of Durham, in council assembled,

Sheweth,

That the adoption of a decimal or simple arithmetical system of coins and accounts would greatly diminish the amount of labour in all monied and mercantile transactions, and materially lessen the complication of the present system.

That the practicability and facility with which our existing coinage may be rendered decimal has been, in the opinion of your Petitioners, established by the Royal Commissions and the Committee of your honourable House, by which the question has been fully discussed and advocated.

That the adoption of the pound sterling as the unit appears to be the most advantageous and least difficult mode of effecting this desirable national change.

That your Petitioners, therefore, pray that your honourable House will be pleased to forward such measures as may give full effect to the recommendation of those Commissions and of the Committee of your honourable House.

And your Petitioners will ever pray, &c.

MARK STORY, Mayor.

Blackburn Commercial Association.

The humble Petition of the Directors of the Commercial Association established at Blackburn, in the county of Lancaster,

Sheweth,

That the general adoption of a decimal system of coins, weights, and measures would save a large amount of time and labour in the daily transactions of manufacturing and mercantile establishments.

That the first step to a decimal coinage has been already taken, by the issue of the florin, marked one-tenth of a pound.

That, to complete the system, two new coins only are required, namely, a silver coin, to be called a cent, and to be marked one-tenth of a florin; and a copper coin, to be called a mil, and to be marked one-tenth of a cent.

That no change in the existing gold coins will be required to complete this system.

That a decimal coinage, from the pound downwards to the mil, is supported by the highest scientific and commercial authorities, and its importance has been urged upon successive Governments by Royal Commissioners of 1838 and 1843, and by a Committee of your honourable House in 1853.

That in America, in France, and almost in every nation in Europe, a decimal system of money and accounts has been already adopted, and that whatever changes have been made in the coins of those countries, there has not in any instance been any departure from the proved convenience of the decimal system.

Your Petitioners therefore humbly pray that your honourable House will be pleased to take such course as may lead to the early issue of the required coins to complete the decimal system of moneys of account from the pound.

And your Petitioners, as in duty bound, will ever pray.

ROBERT HOPWOOD, President.

No. 8.

Petitions to House of Commons.

Manchester Chamber of Commerce.

The Petition of the Directors of the Chamber of Commerce and Manufactures at Manchester.

Sheweth,

That your Petitioners repeat the conviction which they have expressed to your honourable House in previous Sessions that the adaptation of a decimal system to the coins, weights, and measures of the United Kingdom would greatly increase facilities in mental and manual operations, not only in matters of commercial concern, but in those of daily life.

That your Petitioners are not insensible to the difficulties which may attend this change; but they believe that such inconvenience will be but temporary, whilst the advantages to arise from it will be important and lasting.

That your Petitioners approve of the recommendation of the Select Committee of your honourable House contained in their Report of the 1st of August, 1853 (Sess. No. 851), and especially of the retention of the pound sterling as the integer; they therefore humbly and earnestly pray,

That your honourable House may forthwith proceed to initiate such measures as may establish throughout these realms a system of decimal proportions in coins at the earliest practicable period, to be followed, with as little delay as may be compatible with due consideration, by a similar arrangement in regard to weights and measures.

By order and on behalf of the Directors of the Chamber of Commerce and Manufactures at Manchester,

THOS. BAZLEY, President.

City of London Merchants, Brokers, &c.

The humble Petition of the undersigned Merchants, Bankers, and others, of the city of London,

Sheweth,

That the adoption of a decimal or simple arithmetic system of coins, weights, and measures would save a large amount of labour in the daily business of banks and mercantile establishments, and would greatly diminish the liability to error in all calculations of quantities and value.

That your Petitioners are of opinion that any other mode of decimalizing our currency than from the pound downward is altogether impracticable.

That the pound constitutes an English national fixed idea of value and position, and is associated with every existing contract, and every comparison of past revenue, expenditure, and price, and must be retained.

That the decimalization of our coinage from the pound has the support of the highest scientific and commercial authorities, and has been urged upon successive governments by the Royal Commissions of 1838 and 1843, and by the Committee of your honourable House in 1853.

That America, France, and nearly the whole of the nations of Europe have already adopted decimal systems of money and accounts.

Your Petitioners therefore humbly pray that your honourable House will be pleased to determine that the needful measures shall be taken to prepare the way for the introduction of a decimal system of coinage and accounts.

T. M. Weguelin, Governor of the Bank of England.
S. Neave, Deputy Governor of the Bank of England.
N. M. Rothschild & Sons, New Court.
Morris, Prevost, & Co., Gresham Street.
W. W. Scrimgeour, Manager, Union Bank of London.
Geo. Pollard, Secretary, London Joint Stock Bank.
M. Cutbill, Manager, Commercial Bank of London.
H. Luard, Secretary, London and County Bank.
London and Westminster Bank, per J. W. Henderson, Manager, 41, Lothbury.
Matheson & Co., 3, Lombard Street.
Palmer, Mackillop, Dent, & Co., 11, King's Arms Yard.
Rew, Prescott, & Co., 55, Old Broad Street.
Travers & Sons, 19, Swithins' Lane.
Moffatt & Co., Fenchurch Street.
W. J. Hall & Co., Custom House Quay.
Martinez, Gassiott, & Co., Mark Lane.
Finlay, Hodgson, & Co., St. Helen's Place.
Sinclair, Hamilton, & Co, St. Helen's Place.
R. M. Holborn & Sons, 39, Mincing Lane.
Wm. Edwd. Franks & Sons, 35, Fenchurch Street.
Jas. G. Clark, 27, Mincing Lane.
Chas. Sutherland & Co., 24, Mincing Lane.
J. T. De Jonge, 71, Mark Lane.
Andw. Lange & Co., 54, Fenchurch Street.
Straith & Co., 11, Great Tower Street.
Barber, Nephew, & Co.. 36, Fenchurch Street.
Bremner & Till, 9, Billiter Square.
Wm. Field, 27, Mincing Lane.
J. C. Im. Thurm & Co., 24, Lime Street.
T. C. Rohweger, 7, Fen Court.
A. & E. Rosselli, 22, Mincing Lane.
E. Fontanella, 11, Lime Street.
H. Schmidt, 2, Lime Street Square.
Castendieck & Schlutow, 37, Mincing Lane.
Jonas Simonson & Co., 4, Savage Gardens.
C. Moller, 2, Muscovy Court, Tower Hill.
James Vanhouse & Son, 37, Mincing Lane.
Edwd. Wackerbarth & Co., Ratcliff.
Parker, Son, and Pritchard, 131, Fenchurch Street.
Fairrie Brothers & Co., Church Lane, Whitechapel.
C. A. Jonas & Co., 52, Gracechurch Street.
Smith, Sundius, & Co., 76, Cornhill.
Andw. Maris, 3, Abchurch Lane.
Th. Merry & Son, 139, Fenchurch Street.
G. M. Vadelson, 21, Mincing Lane.
Wm. Turck, 34, Broad Street Buildings.
Price, Gifford, & Co., 5, Mincing Lane.
Richd. Quincey, Billiter Street.
Hecht Brothers, 35, Seething Lane.
Crawford, Colvin, & Co., 71, Old Broad Street.
J. Thomson, S. Bonar, & Co., 7, Austin Friars.
J. Pattison & Son, 57½ Old Broad Street.
Saml. Dobree and Sons, 6, Tokenhouse Yard.

No. 8.
Petitions to House of Commons.

Geo. Peabody & Co., 22, Old Broad Street.
Arbuthnot, Latham, & Co., Great St. Helen's.
Jas. Watt & Co., 18, London Street.
Anthy. Gibbs & Sons, 15, Bishopsgate Street.
Forster & Smith, New City Chambers.
Small & Co., 8, Old Jewry.
Heywood & Co., 4, Lombard Sreet.
Thomson Hankey & Co., 7, Mincing Lane.
W. S. Lindsay & Co., 8, Austin Friars.
Wood, Field, & Hanbury, 25, Mark Lane.
Nic. Breebaart, 15, Commercial Sale Rooms.
Cornely & Co., 50, Lime Street.
G. B. Jennings, 2, Dunstan Court.
H. P. Rouquette & Co., 5, Lime Street Square.
Jno. Goddard & Co., 14, Mincing Lane.
S. Carroll & Son, 37, Mincing Lane.
W. Halls, 14, Mincing Lane.
Chas. Roberts, 38, Mincing Lane.
John Rains, 11, Great Tower Street.
Patry & Pasteur, 38, Mincing Lane.
Drolenvaux & Co., 14, Mark Lane.
Albert Dummler, 11, Mark Lane.
John Chapman & Sons, 8, Commercial Sale Rooms.
L. B. Schroeder, 45, Commercial Sale Rooms.
Moul & Sons, 106, Fenchurch Street.
Schafer & Brown, 48, Fenchurch Street.
Jno. Hardcastle, 22, Eastcheap.
E. W. Heckscher & Co., 53, Church Street, Minories.
J. H. Gœtze, 90, Great Tower Street.
S. Cahn & Co., 3, Copthall Chambers.
W. Phippen, City Road Rice Mills.
Dav. Taylor & Sons, 76, Mark Lane.
J. Maurenbrecher, & Co., 11, Mark Lane.
Taylor & Whalley, 16, Mincing Lane.
Wilson, Rose, Graham, & Co., 74, Old Broad Street.
Peek Brothers & Co., 21, Eastcheap.
F. W. Roller & Co., 3, Love Lane.
H. S. Samuel, 133, Fenchurch Street.
Jas. Cullen, 34, Mark Lane.
Cuylits, Simond, & Co., 14, Cullum Street.
Rehder & Boldemann, 14, London Street.
Thos. Brumleu, 30, Rood Lane.
E. Fermi, 32, Leadenhall Street.
Justus Eck, 8, Philpot Lane.
Morrison, Dillon, & Co., Fore Street.
Wm. Hawes, Size Lane.
Foster, Porter, & Co., Wood Street.
J. & R. Morley, Wood Street.
B. Salomons & Sons, Old Change.
White, Son, & Co, 108, Cheapside.
Llewellin, Truman, & Hitchcock, 23, Wood Street.
Hanson, Smiths, & Stevens, 31, St. Martin's-le-Grand.
Caldecott, Sons, & Wilcox, Cheapside.
M'Alpin & Nephew, 63, Broad Street.
Hocking, Hitchcock, & Co., 2, Gresham Street.
Ellington & Ridley. Newgate Street.
Thos. Evans, 10, Wood Street.
Lindsay & Matthew, 11, Wood Street.
Lee Brothers, 27, Wood Street.
Hancock & Humphrey, 37, Wood Street.
Bennock, Twentyman, & Rigg, Wood Street.
Vyse & Sons, Wood Street.
Munt, Brown, & Co., Wood Street.
Ward, Sturt, & Co., Wood Street.
Sturt & Sharp, Wood Street.
Dent, Allcroft, & Co., Wood Street.
Copestake, Moore, Crampton, & Co., Bow Church Yard.
John Wreford & Co., Aldermanbury.
Faudel & Phillips, Newgate Street.
J. B. & W. Nevill & Co., Gresham Street West.
Smith & Dewey, Wood Street.
Luckman & Cotching, 33, Wood Street.
J. T. Basset, 34, Wood Street.
Edward Bradley, 38, Wood Street.
Taylor, Rositer, & Plumb, 75, Wood Street.
G. Parker, 12, Addle Street.
Smith & Co., 5, Fell Street, Wood Street.
Phillips, Faithfull, & Palmer, Watling Street.
Brett Brothers & Co., 74, Wood Street.
Westron, Dignam, & Co., Watling Street.
Stuart & Taylor, 46, Old Change.
Fishers & Robinson, Watling Street.
Dollfus, Mieg, & Co., 50, Friday Street.
P. Inglis & Wakefield, 40, Cannon Street West.
Howse & Mead, 19, St. Paul's Church Yard.
Cook, Son, & Co., 22, St. Paul's Church Yard.
Hatton & Hardie, 6, Wood Street.
David Leslie, 11, Wood Street.
Hugh Jones & Co., 108, Wood Street.
J. Tracy, 56, Wood Street.
E. M. Morland & Co., 43, St. Paul's.
Hubbard, Wollen, and Weston, 66 and 67, Wood Street.
Rob. Curwen & Co., 6, Gutter Lane.
Headland, Kearsley, & Okell, 42, Gutter Lane.
Storar, Fortescue, & Co., 138, Cheapside.
Jas. Prescott, 4, Cripplegate Buildings.
J. & J. Stevenson, 9, Cripplegate Buildings.
Jonas Brothers & Co., 51, Aldermanbury, City.
Ovington, Jeffreys, & Welch, 137, Cheapside.
Rob. Bentley & Co., 136, Cheapside.
Rogers & Wroe, 134, Cheapside.
John Dick, Sons, & Co., 53 and 54, Aldermanbury.
Field & Sons, 114 and 115, Fore Street.
Thos. Mabyn, 2, Aldermanbury.
Gregory, Blenkinsop, & Co., 20, Aldermanbury.
Josh. Stephens, 64, Aldermanbury.
W. Hubbard, 64, Aldermanbury.
E. & H. , 10, Trump Street.
Gilbert & West, 4, Russia Row.
Bailey, Fox, & Co., 5, Russia Row.
Watts & Mouat, 2 and 3, Russia Row.
S. Farden & Co., 6, Russia Row.
James Hutchinson, Chairman of the Committee of the Stock Exchange.
Field, Son, & Wood, Warnford Court, Throgmorton Street.
John Norbury, Deputy Chairman of the Committee of the Stock Exchange.
Geo. Webb, Secretary, Committee, Stock Exchange.
Watson & Bennett, Royal Exchange.
Mihill Slaughter, Secretary of the Railway Department, Stock Exchange.
Linton & Clarke, 2, Royal Exchange Buildings.
David Salomons, Alderman of London.
Turner & Akroyd, 2, Royal Exchange Buildings.
Horace Wilkinson, Threadneedle Street.
Lowndes, Surgey, & Woolley, 1, Royal Exchange Buildings.
H. & G. Towgood, 33, Throgmorton Street.
George Gandell, 1, Royal Exchange Buildings.
Bragg & Stockdale, 6, Throgmorton Street.
Clem. Uzielli, 21, Threadneedle Street.
A. Gooch, Official Assignee, Stock Exchange.
J. W. Lockwood, 3, Crown Court, Threadneedle Street.
Henry Tudor & Son, Stock Exchange.
W. A. Bradock, 3, Hatton Court, Threadneedle Street.
John Powell, 41, Threadneedle Street.
P. W. Thomas, Sons, & Co., 50, Threadneedle Street.
John R. Pike, 41, Threadneedle Street.
Robt. Peake, Stock Exchange.
Alex. Lamond, 21, Royal Exchange.
H. C. Peake, Stock Exchange.
Jas. Sutton, 22, Royal Exchange.
Chas. Creppen, Stock Exchange.
Josh. Lawrence, Auction Mart.
A. C. Stratton, Stock Exchange.
Sims & Hill, 3, Bartholomew Lane.
W. T. Gooch, 3, Bartholomew Lane.
G. B. Herbert, 15, Angel Court, Throgmorton Street.
J. H. Butler, Stock Exchange.
Langdale & Son, Stock Exchange.
Geo. Duthy, Stock Exchange.
Marsden & Shaw, Stock Exchange.
John Smith, Stock Exchange.
Geo. E. Seymour, Stock Exchange.
Josh. Clissold, Stock Exchange.
John Guillemard, Stock Exchange.
David M'Neil, Stock Exchange.
O. W. Price, Stock Exchange.
J. B. Brize, Stock Exchange.
Chas. Bennett, Copthall Chambers.
Hosier Morgan, Stock Exchange.
Geo. Hazlewood, 15, Angel Court.
F. Wetherby, 15, Angel Court.
J. F. Tidcott, 10, Warnford Court.
C. Canceller & Son, 68, Old Broad Street.
Josiah Bates, Stock Exchange.
Arthur Ballantine & Co., No. 4, Austin Friars.
Thos. Upton, Stock Exchange.
J. C. & C. W. Morrice, Stock Exchange.
Levi A. Crawley, Stock Exchange.
Carr & Waller, Stock Exchange.
E. L. Hayward, Stock Exchange.
Geo. Lawford, 5, Warnford Court.
Geo. H. Jackson, Stock Exchange.
J. S. Yeats, 9, Warnford Court.
Forbes Mosse, 65, Old Broad Street.
John Watson Knight, 7, Throgmorton Street.
John Hutton, 11, Warnford Court.
Thos. Vile, 18, Throgmorton Street.

Archd. Macnicoll, 12, Throgmorton Street.
Fox & Taylor, 19, Throgmorton Street.
Haes & Sons, 15, Throgmorton Street.
J. J. Arnull, Stock Exchange.
Chas. Winsdale, 17, Throgmorton Street.
Jas. G. Clarke, Stock Exchange.
A. Hudson, 4, Austin Friars.
Geo. McDonald, Stock Exchange.
Francis Austin, Stock Exchange.
M. O. Scott, 5, Bank Buildings.
R. S. Maitland, Stock Exchange.
J. G. Bone, 5, Bank Chambers.
S. Smith & Son, 7, Bank Chambers, Lothbury, and Stock Exchange.
Robt. Davidson, 5, Bank Chambers.
Wm. Sharpe, 1, Bank Chambers.
Ball Harrison, 8, Bank Chambers.
F. E. C. L. Crofton, 1, Bank Chambers.
A. C. Simpson, 23, Tokenhouse Yard.
H. Druitt, 23, Tokenhouse Yard.
T. L. Thomas, 3, Copthall Buildings.
Johnson, Longden, & Co., 22, Tokenhouse Yard.
Alfred Whitmore, 17, Change Alley.
Ewart & Bell, 3, Copthall Buildings.
W. Rickard, 3, Bank Chambers.
Forbes & Fielding, 3, Copthall Buildings.
O. Raymond, 6, Bank Chambers.
Holderness & Fowler, 23, Change Alley.
T. Myall, 3, Bartholomew Lane.
Eykyn Brothers, 22, Change Alley.
Herbert Scott, 16, Throgmorton Street.
Barry & Co., 7, Birchin Lane.
E. Routh, 16, Throgmorton Street.
Lyon & Co., 2, Birchin Lane.
John Cherry, Change Alley.
Crosley Brothers, 30, Cornhill.
Henry Caldecott, 28, Cornhill.
H. & C. Beardshaw, 6, Bank Chambers, Lothbury.
Theodore Lloyd, 57, Threadneedle Street.
Huggins & Rowsell, 14, Austin Friars.
Scrutton & Son, 81, Old Broad Street.
Wm. Morris, 80, Old Broad Street.
Geo. Harris & Sons, Change Alley.
Wm. Froom, jun., 20, Change Alley.
R. Milson, Stock Exchange.
Westropp & Foote, 75, Old Broad Street.
Chas. W. Lodge, Stock Exchange.
L. J. Baker, 75, Old Broad Street.
W. H. Bishop, Stock Exchange.
John Havelock, Stock Exchange.
Jno. Heseltine, Stock Exchange.
Baruch Castello, Stock Exchange.
Hill & Castello, Stock Exchange.
T. C. Mundey, 75, Old Broad Street.
Borthwick & Wheeler, Stock Exchange.
Wollaston & Son, 3, Adams Court.
H. G. Tatham, Stock Exchange.
M. Harman & Sons, 2, Warnford Court.
John Inchbold, Stock Exchange.
Fred. Warner, 12, Copthall Court.
Chas. W. Stokes, Stock Exchange.
Albert H. Petre, 9, Tokenhouse Yard.
Edwd. Cazenove, Stock Exchange.
Henry White, 7, Tokenhouse Yard.
H. Akroyd, Stock Exchange.
Jas. Robertson, 5, Tokenhouse Yard.
R. E. Griffith, Stock Exchange.
Alfred Bingham, Stock Exchange.
John O'Neal, Stock Exchange.
H. J. Meadows, Stock Exchange.
Roger Mortimer, 77, Old Broad Street, London.
Geo. Batten, Stock Exchange, and 26, Throgmorton Street.
J. Halse, Stock Exchange.
J. P. Temple, 11, Royal Exchange.
Aubrey Browne, Stock Exchange.
J. B. Balcombe, 19, Royal Exchange.
Albert Cohen, Stock Exchange.
Chas. Jellicoe, the Crescent, New Bridge Street.
Jas. Jno. Downes, Economic Life Assurance Society.
J. M. Terry, 1, New Bridge Street, Blackfriars.
T. R. Edmonds, Legal and General Life Association Society.
D. MacGillivray, 45, Cheapside.
Thos. W. Farnell, Legal and Commercial Assurance Society.
Thos. Robinson, 67, Fleet Street.
Saml. Ingall, Imperial Life Insurance Company.
John Pope Cox, 67, Fleet Street.
Peter Hardy, London Assurance Corporation.
Fredk. Hendriks, Globe Insurance, Cornhill.
Jno. Goddard, Rock Life Office.
Archibald Day, London and Provincial Law Assurance Society.
W. Lewis, Family Endowment Society.
Benj. Henderson, Liverpool and London Fire and Life Office.
Rob. Tucker, Pelican Life Insurance Office.
Chas. Ansell, jun., National Life Assurance Society.
Jenkin Jones, National Mercantile Office.
C. J. Bunyon, Norwich Union Life Office.
W. S. Gover, British Equitable Assurance Company.
Geo. Grant, Scottish Provident Institution, London.
John Laurence, London Assurance Corporation.
J. E.C. Koch, Scottish Amicable Life Assurance Society.
W. Ratray, Victoria Life Assurance Company.
Sam. Brown, Guardian Assurance Office.
John Reddish, Royal Farmers and General Insurance Company.
W. B. Hodge, General Reversionary and Investment Company.
Jeremiah Lodge, Palladium Life Office.
Edwin Jas. Farren, Gresham Assurance Company.
Edwd. Cheshire, Institute of Actuaries.
G. H. Pinckard, Clerical, &c. Life Assurance Company.
Jno. Browne, Westminster Fire Office.
J. Hill Williams, jun., Hon. Sec. Institute of Actuaries.
Thos. Cave, Anchor Insurance Company.
W. M. Hepper, Assistant Secretary, Manchester Fire Office.
C. Ingall, Mutual Life Assurance Society.
John Beadnell, Protector Endowment Loan and Annuity Company.
B. Massey, Professional Life Office.
Edwd. P. Clark, Accountant to General Annuity Endowment Association.
Joseph Marsh, National Provident Institution.
W. B. Baker, Temperance and General Life Office.
Chas. Stuart Cansdell, Solvency Guarantee Company.
Thos. Fraser, Life Association of Scotland.
H. B. Taplin, Achilles Life Office.
E. Osborne Smith, Pelican Life Assurance Society.
Geo. Thomson, Merchants' and Tradesmen's Life Assurance Society.
W. S. Downes, Law Life Assurance Society.
Edwd. Fredk. Leeks, City of London Life Office.
F. A. Engelbach, Alliance Assurance Company.
J. Baker Gabb, Alliance Marine Assurance Company.
Geo. Clark, Argus Life Office.
Wm. Emmens, Church of England Assurance Institution.
J. Hobson, National Guardian Life Office.
J. J. Williams, Magnet Life Assurance.
Wm. Salt, Magnet Life Office.
W. E. Hillman, Star Life Office.
J. W. Hampton, Alfred Life Office, 7, Lothbury.
James Bennett, Provincial Insurance Company.
H. S. Davis, Alfred Life Office, 7, Lothbury.
Wm. Eykelbosch, jun., Birkbeck Life Office.
Geo. Cole, Birkbeck Life Office.
Henry Smith, Colonial Life Office.
W. T. Robinson, Minerva Life Assurance Company.
Henry Thomson, jun., Scottish Provident Assurance Company.
John Newton, Anglo-Australian Life Assurance Company.
Henri Chris. Eiffe, General Indemnity Assurance Company.
Henry Leigh Cox, General Indemnity Assurance Office.
E. Daniels, Phœnix Life Assurance Company.
A. H. Bailey, 3, Crescent, New Bridge Street.
Thomas Barlow, 3, Princes Street, Bank.
Charles Mallendar, Cannon Street West.
H. W. Porter, Alliance Assurance Office, 1, Bartholomew Lane.
Geo. H. Float, Monarch Life Office.
Ralph P. Hardy, Eagle Insurance Office.
Jas. Dix, National Provident Institution.
J. B. Haycraft, Unity Office, 40, Pall Mall.
S. O. Bishop, 13, Old Jewry Chambers.
G. I. Oldfield, Albion Life Office.
C. T. Racine, Victoria Life Office.
J. B. Allan, Victoria Life Office.
Charles Rouse Brown, Westminster Fire Office.
W. Howe Preston, Equitable Fire Office.
Henry Marshal, Metropolitan Life Office.
F. Allen Curtis, Mentor Life Assurance.
Wm. J. Vian, Railway Passenger Assurance.
Henry Cooke, North of England Insurance.
Chas. James Thicke, British Mutual Life Assurance.
Saml. Green, National Industrial, &c. Company.
James Godfrey, Property Protection Society.
Chs. Wm. Roe, Wellington Life Assurance Society.

No. 8.
Petitions to House of Commons.

M. Saward, Promoter Life Office.
Henry Cross, Law Fire Office.
Richd. Hodson, Householders' Life Office.
James Henry James, Middle Temple.
Richd. Coultard, Safety Life Assurance Society.
John Thompson, New Equitable Life Assurance Company.
John Cuff, 449, Strand.
Jno. Hooke, Palladium Life Office.
H. Membury Wakley, New Equitable Life Office.
W. C. Urquhart, St. George Assurance Company.
W. Cleland, Industrial and General Life Office.
J. Berwick, United Kingdom Life Office.
Hirsch Strother & Co., 3, Great St. Helens.
Henry Woods, 60, Mark Lane.
L. Fischel, 5, Langbourne Chambers, Fenchurch Street.
Johnston, Taber, & Co., 32, Crutched Friars.
T. Stidstone, City Road and St. Swithin's Lane.
Charles Dames, 30, Rood Lane, Fenchurch Street.
M. J. & R. P. Keighley, Little Tower Street Chambers.
Fredk. & Edmund Godsell, Great Tower Street.
J. R. Hook, Cullum Street.
F. P. Wilson, 1, George Yard.
Wm. Roberts, 6, Idol Lane.
Wm. T. Lay, 28, St. Mary at Hill.
C. Julius Meran, 15, Bishopgate Street.
T. H. Elmenhorst & Co., 20, Mark Lane.
Kleinwort & Cohen, 4, Cullum Street.
A. & G. W. Alexander & Co., 40, Lombard Street.
Fred. Harrison, 21, Threadneedle Street.
Saml. Thos. Hill & Co., 1, Royal Exchange Buildings.
Keeling & Hunt, Monument Yard.
Trower, Lawson & Trower, 32, St. Mary at Hill.
Hill & Underwood, 25, Eastcheap.
Henry Harvey, 77, Great Tower Street.
Ferguson & Forster, 23, Eastcheap.
Henderson & Constable, 90, Great Tower Street.
Finnis & Fisher, 79, Great Tower Street.
Pinto, Perez, & Co., 36, Crutched Friars.
Castle Theakston Stait, 64, Lower Thames Street.
H. & S. Donaldson, 35, Mark Lane.
Allan & Blake, 11, Mark Lane.
J. Copplestone, 11, Mark Lane.
Osmond & Co., 60, Fenchurch Street.
Henry Butler & Son, 110, Fenchurch Street.
John Lidgett & Sons, 9, Billiter Square.
Fred. Giesler & Co., 32, Fenchurch Street.
Marshall & Edridge, 34, Fenchurch Street.
Barnett Meyers, Mill Lane, Tooley Street.
Geo. Ross, Church Lane.
H. Bade, Moorgate Street.
Wattenbach, Heilgers, & Co., 14, Mincing Lane.
Gray & Clark, 91, Great Tower Street.
Robert Hunter, 173, Fenchurch Street.
R. Thornton Brown, Old Broad Street.
Gray & Co., Mincing Lane.
C. T. Detmold, Mincing Lane.
J. A. Detmold, 20, Mincing Lane.
Geo. Rühl & Co., 23, Crutched Friars.
C. Bremer, jun., 19, London Street.
John Scott, St. Swithin's Lane.
Litchfield & Gronsund, 2, John Street, Minories.
Chas. Avery, 135, Fenchurch Street.
Danl. Harrison, 3, Great Tower Street.
Jacob Cuocarlo, 4, Cullum Street.
Andrew Lusk & Co., 62, Fenchurch Street.
J. K. Elay, Colonial Coffee House.
W. Baither, 23, Cullum Street.
Brand & Roser, 3, New London Street.
George Chapman, 40, Mincing Lane.
J. W. Hart, 60, St. Mary Axe.
Edwd. S. Winser, 3, St. Mary Axe.
Turck, Barclay, & Co., Broad Street Buildings.
Thomas Lloyd & Co., 2, Austin Friars.
C. Tennant, Sons, & Co., 101, Upper Thames Street.
J. & E. Williams, 137, Fenchurch Street.
Gerrit Van Houten, 12, Copthall Court.
W. Northcott, 13, Rood Lane.
Thos. T. Wall, 2, Great Prescot Street.
Wm. Townend & Co., 3, Brabant Court.
P. F. Maire & Co., 14, Mark Lane.
A. B. Thompson, 21, Cullum Strreet.
Warre Brothers, 32, Fenchurch Street.
G. W. Berridge, 22, St. Swithin's Lane.
J. S. Smith, Eagle Office.
M. A. Black, 30, Essex Street.
Geo. Scott, 40, King William Street, City.
Jno. Coles, 73, Cheapside.
Jno. Parke, Phœnix.
Henry Fache, 3, Church Road.
Edward Laing, 15, Victoria Road, Holloway.
Wm. Lethbridge, St. Paul's School, London.
J. H. O. Brown, 70, Grosvenor Terrace, Horseferry Road, Westminster.
W. P. Clirehugh, Scottish National Life Office.
Wm. A. Guy, M.B., 26, Gordon Street.
Wm. Goring, Accidental Death Insurance.
John Henry Doyle, Deposit Life Office.
John Madden, Ark Life Office.
Wm. Henry Smabridge, Scottish Equitable Life Office.
R. W. Roberts, Saxon Life Assurance Office.
Fredk. Hodge, Saxon Life Assurance Office.
John Kelday, Defender Insurance Office.
Alexr. Scott, London and Country Defender Insurance Office.
James Francis Quartley, Brunswick Life Office.
J. Anderton, West of England Insurance Office.
J. S. Barr, Manager, National Loan Fund Society.
A. Blondel, National Loan Fund Society.
Alexr. Richardson, National Loan Fund Society.
Wm. Hulme Beeman, Accountant, New Equitable Life Office.
R. Henry Ryland, 44, Charing Cross.
J. Graham Lowe, Agriculturist Insurance Company.
J. V. Hansley, Palladium Life Assurance.
W. P. Pattison, 7, Waterloo Place.
Henry Mortlock, 7, Waterloo Place.
Lacy Avame, United Kingdom Life Company.
Josh. Owen, 8, Waterloo Place, Pall Mall.
A. J. Russell, United Kingdom.
J. J. Smith, 19, London Street.
Tho. Whitmore & Co., 14, Mincing Lane.
Messrs. Broadhurst, 25, Cullum Street.
Robt. Carter, 14, Philpot Lane.
Wm. Loeder, 1, New Broad Street.
Betham, Cerito, & Co., 4, Cullum Street.
Thomas Bownas, Harton, Northumberland.
Edwd. Barber, 36, Fenchurch Street.
Cahlmann Brothers, 13, Austin Friars.
John Barnett, 37, Mincing Lane.
W. Adolph & Co., 9, Bury Court.
C. Devaux & Co., 62, King William Street.
Baum, Sons, & Co., 58, Lombard Street.
Samuel & Montagu, 21, Cornhill.
J. L. Simmonds, 54, Lime Street.
Fredk. Claudet, 6, Cannon Street.
Murton & Webb, 25, Mincing Lane.
Sterry, Sterry, & Co., 23, Cannon Street.
Ruck, Fenwick, & Ruck, 19, St. Dunstan's Hill.
Octavius Phillips & Co., 91, Great Tower Street.
S. F. L. Pereira, 91, Great Tower Street.
Farley & Boyes, 79, Great Tower Street.
Messrs. Brownings, 37, Mark Lane.
Aders & Hogg, 32, Crutched Friars.
John Bonus & Son, 18, Cannon Street.
Wyatt & Young, 10, Mark Lane.
Magalhaens, Reay, & Co., 75, Mark Lane.
Jerram & Williamson, 14, Fenchurch Buildings.
Devitt & Moore, 9, Billiter Street.
Jas. & Hy. Goss, 9, Billiter Street.
James Wardrop, 19, Little Tower Street.
Grant, Hodgson, & Co., 34, Fenchurch Street.
Henry Hall & Co., 34, Fenchurch Street.
W. Smith & Co., 9, Rood Lane.
E. Bernoulli, 4, Austin Friars.
M. Levin, 13, Trinity Square.
Syers & Co., 25, Cullum Street.
R. Polhill, 15, Mark Lane.
J. C. Quick & Co., 148, Fenchurch Street.
Geo. Croshaw, 166, Fenchurch Street.
M. F. Montz Van Swyndregt, 25, Mincing Lane.
J. P. Thol & Co., 5, Fen Court.
C. F. Pellas, 34, Fenchurch Street.
G. Waterworth, 2, Bishopsgate Street.
Sargeant & Co., 131, Fenchurch Street.
W. G. Heath, 38, Mincing Lane.
Macnaughtan & Co., 2, Hammond Court.
W. M. May & Co., 123, Fenchurch Street.
W. S. Groom, 13, Rood Lane.
M. B. Veiel, 35, Mincing Lane.
Fredk. Wienholt, 31, Lombard Street.
Eyrten Brothers, 28, Mark Lane.
J. M. Wright, 6, Mincing Lane.
Thomasset & Cuffley, 2, Great St. Helen's.
Jn. Wykes, 90, Great Tower Street.
Sydney & Wiggins, 20, Mark Lane.
Robert Geo. Clements, Bethnall Green.
Wm. Martin Smith, Cross Lane, St. Dunstan's Hill.
Long & Cornell, 65, Mark Lane.
S. J. James, 41, Lime Street.
Geo. Ballard, 21, Westbourne Street, Hyde Park.

W. E. Bland, 42, Mincing Lane.
G. H. Levinary, 2, Royal Exchange Buildings.
J. Englehardt, 9, Billiter Square.
Henry S. Neville, 131, Fenchurch Street.
Charnley & Abrahfam, 21, Harp Lane, Tower Street.
Geo. R. Gardner, 22, Harp Lane, Tower Street.
Moore & Wilson, 23, Harp Lane, Tower Street.
Matthews & Luff, 21, Water Lane, Tower Street.
J. Seymour & Sons, 24, Lime Street.
Henry Lloyd Morgan, 11, Langbourn Chambers.
Leighton, Williams, & Co., 110, Fenchurch Street.
D. Power, 110, Fenchurch Street.
W. G. Clinkere, Plaistow, Essex.
Henry Bois, 110, Fenchurch Street.
Thomas Melladew, 34, Great Tower Street.
Wm. Wilkinson, 34, Great Tower Street.
Edw. Coombe, 10, Mark Lane.
Hollyer & Beeman, Coal Exchange.
Hooper & Parkinson, 1, Seething Lane.
T. S. Capel, Bridewell Wharf.
Mitchell & Co., 8, Cross Lane, St. Mary-at-Hill.
E. Brandeis & Co., 5, St. Dunstan's Hill.
T. H. Hancock, 2, Idol Lane, Tower Street.
Thos. Schofield, 2, Cross Lane, St. Mary Hill.
Gowa & Co., 113, Leadenhall Street.
Bauer & Co., 113, Leadenhall Street.
Bennetts & Co., 23, Billiter Street.
Feltoe & Co., 6, Billiter Street.
Wm. Prosser, 98, Leadenhall Street.
Falconer & Mercer, East India Chambers, Leadenhall Street.
Fredk. Desnaux & Co., East India Chambers, Leadenhall Street.
Barrows & Reid, East India Chambers, Leadenhall Street.
Smith & Theobald, 115, Leadenhall Street.
Thomas Halstead, 2, Riches Court, Lime Street.
J. Wise Lawson, 50, Lime Street.
Barton, Gash, & Co., Riches Court, Lime Street.
Reid & West, 147, Leadenhall Street.
Laroche, Nainby, & Co., 147, Leadenhall Street.
J. A. Phillips, 52, Lime Street.
W. Stuart, Walbrook.
Jas. L. Bennet, 17, Brook Lane.
J. Isaacson & Co., Norfolk Street.
R. Thomas, Bishopsgate.
R. C. Williams, Wardrobe Place, Doctors' Commons.
Lewis, Nathan, & Co., 7, Birchin Lane.
J. Hay D. Lauhenau, 2, Royal Exchange Buildings.
T. Giffalin, 31, Broad Street Buildings.
James Shields, 4, Bishopsgate Church Yard.
Barter & Co., Langbourn Chambers.
J. White, Old Broad Street.
Jas. Hosking & Co., Sun Court, Cornhill.
E. C. Tomars, 72, Old Broad Street.
Henry Hoffmann, 7, Broad Street Buildings.
Wm. Beard, 75, Old Broad Street.
Thomas Smith, 43, Mincing Lane.
Geo. Hoskins, 38, Bishopsgate Street.
Mathiesen & Ritter, 17, Gracechurch Street.
Owst & Peacock, Bermondsey Wall.
S. Odell, 65, Lower Thames Street.
J. Fatt, Hampden House, Romford.
Rislon & Moore, Worthing.
A. Barnsey, 24, Bedford Street, Bedford Row.
William Bartlett, 8, Lime Street Square.
F. H. Bishop, Bishopsgate Street.
F. W. Gerhard, Cannon House, Cannon Street.
George Belloks, 2, Wellington Street, Goswell Street.
Wm. Morrison, 23, Fenchurch Street.
W. P. Moffatt, 2, Bartholomew Close.
J. R. Wigmore, Bass, & Co., 3, Wharf, City Basin.
A. Jaclim, 4, ———— Street.
James Silon, Thurlow Place, Bethnal Green.
E. C. Hyde, 91, Watling Street.
Edwd. Jay, 79, Whitecross Street, St. Luke's.
D. Pooles, Chester Place, Regent's Park.
J. Nott, Seymour Place.
Cortazze, Garland, & Co., 2, Ingram Court, Fenchurch Street.
Alfred D. Custle, Upper Thames Street.
A. Montagu, 3, Winchester Buildings.
Edwd. Schlesinger & Co., 8, George Yard, Lombard Street.
John Alger Worth, Bridge Dock, Limehouse.
Jos. Adams, Limehouse.
J. G. Harris, 18, Union Grove.
George Hinks, Gould's Hill.
J. B. Vaughan, 56, Borough.
Wymark & Co., 3, Philpot Lane.
M. T. Bishop, 30, Queen Street.
Smith & Beck, 6, Coleman Street.
Toppin & Clark, 7, Coleman Street.
J. H. Page, 8, Coleman Street.
W. T. Tabernacle, 19, Coleman Street, City.
Dodge, Bacon, & Co., 22, Coleman Street.
M. Nickel & Co., 25, Coleman Street.
Richard Field, 34, Coleman Street.
Walford, Fairer, and Harrison, 27, Lawrence Lane, Cheapside.
A. Jephroden & Co., 8, Gresham Street.
Jas. Bodger, 8, Gresham Street.
Wm. Sanderson, 7, Gresham Street.
Benjn. Smith & Sons, 8, London Wall.
Sabel & Co., 80, Coleman Street.
Alfred Hill, 35, Milk Street, Cheapside.
Grosvenor, Chater, & Co., Cannon Street West.
Millington & Hutton, 32, Bridge Row.
Baker, Tucker, & Co., 30, Gresham Street.
J. & R. Robinson & Co., 30, Milk Street.
Keyte, Gunn, & Kidd, 4, Church Court, Old Jewry.
John B. Beale, 17, Dalston Place.
Ross, Mitchell, & Co., 13, Gresham Street.
Edmunds & Rourke, 4 and 5, Gresham Street.
Kay and Richardson, 6, Carey Lane.
H. Bateman, 6, Carey Lane.
H. H. Cannan, 18, Aldermanbury.
W. Pennell, 3, Guildhall Chambers.
Isaac Nicholson, 24, Basinghall Street.
Edward Lane, 6, Aldersgate Street.
Waller, Ede, & Co., 103, Wood Street.
Rogers, Bentley, & Rogers, 103½, Wood Street.
John Paterson, 104, Wood Street.
Fenton, Son, & Co., 120, Wood Street.
Beloe & Spreckley, 124, Wood Street.
J. H. Fisken, 3, Gresham Street.
J. Homan & Co., 2, Milk Street.
J. P. Press, 2, Milk Street.
Engle & Samuels, Mumford Court, Milk Street.
J. Peet & Sons, Mumford Court, Milk Street.
Price, Coker, & Co., 16, Gresham Street West.
James J. Norris & Co., King Street, Cheapside.
Gunnell & Quarell, King Street, Cheapside.
A. McNurran, 24, King Street, Cheapside.
A. J. Worthington & Co., 8, King Street, Cheapside.
Thomas Baker & Son, 17, King Street, Cheapside.
Samuel Mullet, Gresham Street.
M. Andrade, 8, Cripplegate Buildings.
Edwd. Tovey, 38, Noble Street.
Jno. Andrew & Co., 8, Noble Street.
Fredk. Neville & Co., 18 and 19, Noble Street.
Jno. Ross, 3, St. Paul's Church Yard.
Walsh & Brierley, Stannary Works, Halifax, 25, Noble Street, London.
John Finigan, 30, Noble Street.
Somervell & Burr, 35, Noble Street.
F. Brown, 26, Aldermanbury.
Castle, Jones, & Wortley, 7, Love Lane.
Hoyle & Hanson, 69, Aldermanbury.
W. & H. Edwards, 9, Aldermanbury.
A. J. Vieweg, 15, Coleman Street.
Gebhardt, Rottmann, & Co., 24, Lawrence Lane.
Robert Gardner, 46, Lime Street.
Alexr. Gillespie, 3, Billiter Court.
C. B. Harrington, 1, Lime Street Square.
Francis Lyne, 12, Mark Lane.
W. Burnley Hume, 145, Leadenhall Street.
Stephen Kennard & Co., 27, Austin Friars.
Edwd. King, 27, Austin Friars.
Block, Grey, & Block, 10, Old Broad Street.
J. Jaffray & Co., 34, Great St. Helen's.
J. Frankau & Co., 6, Great St. Helen's.
Alf. Gibson & Co., 9, Great St. Helen's.
G. C. Findlay, 31, Great St. Helen's.
Hirsch, Strother, & Co., 31, Great St. Helen's.
H. J. Smith & Co., 30, Great St. Helen's.
Oliver & Field, 3, Great St. Helen's.
Edwd. Higgin & Co., 30, Great St. Helen's.
Graham, Tobias, & Co., 30, Great St. Helen's.
T. J. Walton & Co., 30, Great St. Helen's.
Hy. Dresser, 14, Great St. Helen's.
Thos. Roope, 15, Great St. Helen's.
W. T. Curtis, 17, Great St. Helen's.
H. C. Beaton, 17, Great St. Helen's.
John O. Moore, 25, Great St. Helen's.
A. W. Scaife & Co., 20½, Great St. Helen's.
R. Thurburn, 5, Crosby Square.
F. & G. Garraway & Co., 3, Crosby Square.
A. H. Novelli, 2, Crosby Square.
J. M. J. Baillie, 15, St. Mary Axe.
J. B. Moens, 15, St. Mary Axe.
D. Q. Henriques & Brothers, 2, Jeffrey's Square, St. Mary Axe.
Joseph Dodson, 4, Jeffrey's Square, St. Mary Axe.

No. 8.
Petitions to House of Commons.

J. Sparke, Prowse, & Hall, 17, Gracechurch Street.
H. Larchin, 17, Gracechurch Street.
Geo. L. Munro & Co., 33, Gracechurch Street.
P. Dickenson, 33, Gracechurch Street.
G. B. Harrison, 24, Great Tower Street.
John L. Percy, 26, Great Tower Street.
Per pro J. W. Burdon, Henry Healy, 1, New London Street, City.
W. R. Chalmers, 7, Little Tower Street, City.
Patrick Garvey, per James Gardner, 20, London Street, City.
David Kidd & Son, 70, Mark Lane.
R. T. Maughman & Co., 70, Mark Lane.
A. Lamb, 67, Mark Lane.
Clode & Baker, 78, Mark Lane.
Woolner & Wylie, 79, Mark Lane.
F. Pickert, 79, Mark Lane.
Robt. Finnis & Co., 58, Fenchurch Street.
J. H. Elliott, 4, Martin's Lane.
S. H. Day & Co., 21, Pudding Lane.
Jno. & Jas. Adams & Co., 11, Pudding Lane.
Thos. Pope & Wheeler, Coal Exchange.
Wm. Shally Page, Coal Exchange.
Wm. Falk, 5, St. Dunstan's Hill.
Thos. Gladwish, 5, St. Dunstan's Hill.
John Fowler & Sons, 5, Little Tower Street.
James Laughton & Son, 33, Leadenhall Street.
Jos. Acheson, 102, Leadenhall Street.
Field & Co., per John Croft, 102, Leadenhall Street.
John Janson Croft, 102, Leadenhall Street.
J. Hobson & Son, Leadenhall Street.
Hotchkin, Mobbs, & Prowse, Leadenhall Street.
J. H. Gamble & Co., Leadenhall Street.
W. Kuper & Co., Leadenhall Street.
F. D. Deare & Co., 51, Lime Street.
J. Cawood, 51, Lime Street.
James Scott & Son, Riches Court.
Stephen & Pinder, 47, Lime Street.
Henry Taylor, East India Chambers.
Caruthers & Battes, 127, Leadenhall Street.
W. Balchin, 52, Lime Street.
A. Dunn, 48, Lime Street.
Ionides Sgouta & Co., 17, Gracechurch Street.
A. Wigdahl, 65, Lower Thames Street.
N. D. Zunof, 31, Broad Street Buildings.
A. Holmes, 101, Upper Thames Street.
Edmd. Dowling, King Street, Tower Hill.
Saml. Bickley, Lloyd's.
Dean Convelu & Co., New Broad Street.
B. Nolay, Lombard Street.
Richard Baker, 54, Lime Street.
A. O. Robinson, 25, Philpot Lane.
N. Zygomalas, 1, Winchester Buildings.
James Clark, 25, Billiter Street.
S. Haynes Angier, Coal Exchange.
H. & J. Enthoven & Sons, 8, Moorgate Street.
Bateman & Bramwell, 36, Cornhill.
Price & Brown, 4, Change Alley.
Joseph de Yrigoyte, 13, Webbe Court Terrace, New Kent Road.
Stephen Henry, 19, London Wall.
Denham & Smart, 11, St. Bennett Place, Gracechurch Street.
Alfred W. Potter, Lloyd's.
Algernon E. Sidney, 2, Woburn Place.
L. Rodomnartri & Co., 37, Finsbury Circus.
A. Sevastopulo & Sons, 9B, New Broad Street.
Schelus Nurt, 35, Street.
E. H. Tupp, Adam Court.
M. G. Lavers, 1, Mincing Lane.
Miguil Yglesias, 9, King's Arms Yard.
Chas. Watken, Kingsland Road.
K. C. Luscombe, Westminster.
F. Redfern, 47, Ludgate Hill.
T. A. Jordan, 20, Pump Row.
Wm. Jones & Sons, Islington.
Edward Granger, 40, Wilson Street, Finsbury.
Rd. Quincey, 22, Billiter Street.
Chas. D. Solon, Dalston.
John A. Laine, Guernsey.
W. Gold, Great St. Helen's.
John Carter, Fleur-de-lis Street.
Wm. M'Cannon, Rotherhithe.
Goodliffe & Smart, 17, Gracechurch Street.
Patrick C. Don & Co., 33, Clements Lane.
Windle & Co., 10, Gould Square.
Goegg & Beringer, 11, Coleman Street.
Thomas Nicolls Roberts, 11, Coleman Street.
Fredk. Cutten, 21, Coleman Street.
Wm. Burtenshaw, 45, Fore Street.
Matthew Gande, 45, Fore Street.
Stauffer, Son, & Co., 12, Old Jewry Chambers.
Hill, Hudson, Brothers, 4, Lawrence Lane.
James Phillips, 8, Lawrence Lane.
James L. Hicks, 6, Gresham Street.
F. Alexander, 36, Gracechurch Street.
George Cobden & Co., 36, Gresham Street.
D. Aloos, 20, Milk Street.
Samuel Moore, 72, Coleman Street.
Chambers & Ellwood, 29, Gresham Street.
A. Hofmann & Co., 15, Gresham Street.
James Taylor, 14, Gresham Street.
R. C. Dixon, 26, Budge Row.
Joseph Bouch, 2, Milk Street.
Robert T. Lawton, 37, Milk Street.
J. & G. Johnston, 17, Ironmonger Lane.
Honey & Son, 14, Ironmonger Lane.
Charles Barrow, 52, Coleman Street, City.
Scholefield, Brown, & Co., 1, Gresham Street.
Clewley & Co., 3, Buckingham Street.
Chas. W. Bourne & Co., 5, Carey Lane.
Welsh, Margetson, & Co., 17, Cheapside.
Bradbury, Greatorex, Beall, & Co., 6, Aldermanbury.
Thos. Tarsey & Co., 19, Aldermanbury.
Francis Ward, 32, Aldermanbury.
Wm. Jno. Barron, 66, Aldermanbury.
George J. Cowan, 69, Aldermanbury.
J. Gibb, 69, Aldermanbury.
Hy. Wilkinson, 70, Aldermanbury.
W. Milne, 72, Aldermanbury.
Dufour Brothers & Co., 19, Gresham Street West.
Powell, Bridgwater, & Co., 69, Wood Street.
Crofton & Rippon, 61, Bartholomew Close.
Saxton, Waddington, & Carey, 87, Bartholomew Close.
Jas. Bamford, Milk Street.
Laurie & Wilson, Watling Street.
Davis, Brothers, & Co., Milk Street.
John Edwards, Gresham Street.
Wm. Hare, 1, King Street, Cheapside.
Wm. Rider, 6, Castle Court, Lawrence Lane.
Thos. Lawes, 5, Castle Court, Lawrence Lane.
Green & Drayton, 79, Newgate Street.
Scales & Herbert, 9, Wood Street.
Jas. Savage, Sons, & Co., 40, Noble Street.
C. R. Collins, 39, Noble Street.
Alfd. Bonnet & Co., 38, Noble Street.
W. Whitworth & Son, 8, Hart Street, Wood Street.
James Clay & Sons, Sowerby Bridge.
Peyton & Iles, Noble Street.
W. Crawley, 1, Noble Street.
Horatio H. Child, 1, Noble Street.
C. Puzzie, 1, Noble Street.
Thos. Sanderson, 1, Noble Street.
Waddington & Sons, 1, Coleman Street.
Ray, Glaister, & Co., 19A, Coleman Street.
Alex. Fyfe & Co., 2, Lawrence Lane.
H. & E. Marriott, 6, Lawrence Lane.
Lilwall & Poole, 7, Lawrence Lane.
H. H. Lindsay, East India Chambers.
Sherer, Waugh, & Meryon, St. Mary Axe.
D. Humphreys & Co., 29, Mark Lane.
Geo. Claridge, 10, Mark Lane.
Crimp & Ward, 7, Old Broad Street.
Glover Brothers, 34, Great St. Helen's.
Dauglish, White, & Hankey, 34, Great St. Helen's.
Alfred Monsell, 34, Great St. Helen's.
Idle & Pardy, 2, Great St. Helen's.
J. Z. Lutiger, 3, Great St. Helen's.
Edmd. Buxton & Co., 9, Great St. Helen's.
Josh. V. Mumford, 31, Great St. Helen's.
George Drevar, 31, Great St. Helen's.
Pegler Brothers, 3, Great St. Helen's.
B. C. T. Gray & Sons, 31, Great St. Helen's.
Tindall & Co., 30, Great St. Helen's.
Dangar & Co., 30, Great St. Helen's.
R. H. Leech, 8, Great St. Helen's.
Perrin, Freeston, & Co., 15, Great St. Helen's.
E. Denny & Co., 29, Great St. Helen's.
J. M. Stodart & Co., 29, Great St. Helen's.
Richd. B. Tugman, 26, Great St. Helen's.
Christiansen & Rapp, 3, Crosby Square.
J. & G. Jeffkins, 2, Crosby Square.
Richd. Buck & Co., 1, Crosby Square.
Bell, Budden, & Co., 2, Jeffrey's Square.
Seymour, Peacock, & Co., 17, Gracechurch Street.
Peter Tindall, Riley, & Co., 17, Gracechurch Street.
Chas. Walton & Sons, 17, Gracechurch Street.
Fredk. Gregory, 17, Gracechurch Street.
Per pro F. W. Brown & Co., A. H. Malyon, 17, Gracechurch Street.
H. Nesbitt, Allhallows Chambers, 49, Lombard Street.
Ashton & Co., 39, Lombard St.
Alexr. Plimpton, 33, Gracechurch Street.
Bennet, Brown, & Co., 34, Gracechurch Street.

No. 9.

Circular to Bankers.

Her Majesty's Commissioners for inquiring how far it may be practicable and advisable to introduce the principle of decimal division into the coinage of the United Kingdom, having under consideration the effect of the introduction of a Decimal Coinage, and in particular of the scheme recommended by the House of Commons' Committee, and known as the £ and mil scheme, on the business of bankers, are desirous of obtaining the opinion of the body of bankers of all descriptions throughout the kingdom on the following points :—

As to the advisability of introducing the decimal principle, in the proposed form, *so far as it may affect the conduct of their accounts,*—

Is it your opinion that the proposed system will enable bankers to keep their accounts with greater ease and convenience—as regards labour, time, and accuracy—or the reverse?

To assist in forming a practical judgment on the point, a table is annexed, which shows the nearest equivalent value in mils of every sum from 1*d.* to 1*l.* By this it will be seen that the number of figures required under the proposed decimal system to express the successive sums from 1*d.* to 10*s.* exceeds considerably the number required for the same purpose under the present system; whilst to express the successive sums from 10*s.* to 1*l.* there is an excess, though a much smaller one, against the present and in favour of the Decimal System.

With the same view a copy is also annexed of a mercantile account as kept under the present system, and as it would appear under the proposed Decimal System.

The advantages of the Decimal System will of course consist in getting rid of the troublesome process of converting pence into shillings and shillings into pounds, in the elementary processes of calculation, and thus reducing the process of account-keeping to the simplicity of the Arabic notation.

On the other hand you will observe the different form in which sums will be stated under the Decimal System, as compared with the present system, e. g. :—

s.	*d.*	*mils.*
0	6	25
0	11	45
1	8	83
2	10	141
6	5	320
10	0	500
12	6	625
17	11	895

The Commissioners are desirous of ascertaining your opinion of the effect which this change in the form of stating different sums will have upon your account-keeping, as regards—

1. Facility and accuracy of entering sums.
2. „ of copying and recopying.
3. „ of calling over.

It has been urged that *conciseness of expression* is more important in account-keeping than *facility of calculation,* inasmuch as the same sum, it is said, is written or uttered ten or twenty times in its transit through the banker's books, and that in this respect the decimal is deficient as compared with the present system.

The Commissioners are desirous of obtaining your opinion as to the validity or invalidity of these considerations :—

Do you think that all or any of them would be found practically important in the daily working of your business?

Do you think that any difficulties arising from them would overbalance the conveniences you anticipate from the adoption of a Decimal System of Coinage and account keeping?

Upon a general view of all the considerations, do you desire a change from the present to a Decimal System, as—

1. Conducive to increased convenience in your own business?
2. As calculated to promote the convenience of all classes generally in their retail transactions, in their account-keeping and calculations, both written and mental, and in their dealings with the fractional parts of the £ sterling?

If your opinion is in favour of the introduction of the decimal principle into our system of coinage and account keeping,—have you any observations or suggestions to offer respecting the nature and extent of the difficulty which must attend the transition, in your accounts, from the present to the Decimal System, and the best means of overcoming that difficulty?

Lastly, do you think that any other Decimal System of Coinage would be more convenient than that recommended by the Parliamentary Committee?

Should any further explanations be deemed requisite to assist you in forming a satisfactory judgment on this subject, the Commission will at all times be ready to communicate with you.

TABLE showing the EQUIVALENT VALUES of all SUMS between 1*d.* and 1*l.* in the PRESENT SYSTEM, and the £ AND MIL SYSTEM, omitting Fractions of a Mil.

s.	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*
0	1	4	1	1	54	2	1	104	3	1	154	4	1	204	5	1	254	6	1	304	7	1	354	8	1	404	9	1	454
0	2	8	1	2	58	2	2	108	3	2	158	4	2	208	5	2	258	6	2	308	7	2	358	8	2	408	9	2	458
0	3	12	1	3	62	2	3	112	3	3	162	4	3	212	5	3	262	6	3	312	7	3	362	8	3	412	9	3	462
0	4	16	1	4	66	2	4	116	3	4	166	4	4	216	5	4	266	6	4	316	7	4	366	8	4	416	9	4	466
0	5	20	1	5	70	2	5	120	3	5	170	4	5	220	5	5	270	6	5	320	7	5	370	8	5	420	9	5	470
0	6	25	1	6	75	2	6	125	3	6	175	4	6	225	5	6	275	6	6	325	7	6	374	8	6	425	9	6	475
0	7	29	1	7	79	2	7	129	3	7	179	4	7	229	5	7	279	6	7	329	7	7	379	8	7	429	9	7	479
0	8	33	1	8	83	2	8	133	3	8	183	4	8	233	5	8	283	6	8	333	7	8	383	8	8	433	9	8	483
0	9	37	1	9	87	2	9	137	3	9	187	4	9	237	5	9	287	6	9	337	7	9	387	8	9	437	9	9	487
0	10	41	1	10	91	2	10	141	3	10	191	4	10	241	5	10	291	6	10	341	7	10	391	8	10	441	9	10	491
0	11	45	1	11	95	2	11	145	3	11	195	4	11	245	5	11	295	6	11	345	7	11	395	8	11	445	9	11	495
1	0	50	2	0	100	3	0	150	4	0	200	5	0	250	6	0	300	7	0	350	8	0	400	9	0	450	10	0	500

s.	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*s.*	*d.*	*mils.*	*£*	*s.*	*d.*	*mils.*
10	1	504	11	1	554	12	1	604	13	1	654	14	1	704	15	1	754	16	1	804	17	1	854	18	1	904	0	19	1	954
10	2	508	11	2	558	12	2	608	13	2	658	14	2	708	15	2	758	16	2	808	17	2	858	18	2	908	0	19	2	958
10	3	512	11	3	562	12	3	612	13	3	662	14	3	712	15	3	762	16	3	812	17	3	862	18	3	912	0	19	3	962
10	4	516	11	4	566	12	4	616	13	4	666	14	4	716	15	4	766	16	4	816	17	4	866	18	4	916	0	19	4	966
10	5	520	11	5	570	12	5	620	13	5	670	14	5	720	15	5	770	16	5	820	17	5	870	18	5	920	0	19	5	970
10	6	525	11	6	575	12	6	625	13	6	675	14	6	725	15	6	775	16	6	825	17	6	875	18	6	925	0	19	6	975
10	7	529	11	7	579	12	7	629	13	7	679	14	7	729	15	7	779	16	7	829	17	7	879	18	7	929	0	19	7	979
10	8	533	11	8	583	12	8	633	13	8	683	14	8	733	15	8	783	16	8	833	17	8	883	18	8	933	0	19	8	983
10	9	537	11	9	587	12	9	637	13	9	687	14	9	737	15	9	787	16	9	837	17	9	887	18	9	937	0	19	9	987
10	10	541	11	10	591	12	10	641	13	10	691	14	10	741	15	10	791	16	10	841	17	10	891	18	10	941	0	19	10	991
10	11	545	11	11	595	12	11	645	13	11	695	14	11	745	15	11	795	16	11	845	17	11	895	18	11	945	0	19	11	995
11	0	550	12	0	600	13	0	650	14	0	700	15	0	750	16	0	800	17	0	900	18	0	900	19	0	950	1	0	0	1,000

	1*d.* to 10*s.*	10*s.* to 1*l.*	Total.
Number of figures required in present system to express all the sums from - -	250	380	630
Do. in £ and mil system - - -	335	361	696

No. 9. Circular to Bankers.

SIR, Decimal Coinage Commission, 5th July, 1856.

I AM directed by Her Majesty's Commissioners for inquiring into Decimal Coinage, to forward to you the enclosed paper, which has been drawn up by them on that part of the inquiry which relates to the business of bankers, as it appears to Her Majesty's Commissioners very desirable that the subject should be fully investigated and discussed by the body of bankers, and by all other parties keeping extensive accounts, whether in large or small sums. They request you to have the goodness to submit to the Committee of Bankers of the enclosed paper, and to take whatever other steps may appear to you best calculated to promote this object; and they hope that you will be enabled to furnish them with the opinion of the body of bankers with whom you may be in communication as to the practicability and advisability of establishing a decimal in place of the present system of accounts and coinage, and with any further observations which may be calculated to assist Her Majesty's Commissioners in forming a correct judgment on this important subject.

I have, &c.

G. S. LEFEVRE,
Assistant Secretary.

To A. W. Robarts, Esq.,
Chairman of the Committee of London Bankers.
To Alderman Salomons,
Chairman of the Committee of London Joint Stock Bank.
To A. Blair, Esq.,
Treasurer of the Bank of Scotland, Edinburgh.
To the Bank of Ireland, Dublin.

REPLIES.

From the COMMITTEE OF THE PRIVATE CITY BANKERS.

SIR, Fenchurch Street, 17th July 1856.

IN reply to your letter of the 5th instant, addressed to the Chairman of the Committee of the London Bankers, I beg to send you the following resolution :—

A meeting of the private City bankers having been convened at the Clearing House, it was resolved—

"That in the opinion of this meeting, after having considered the paper submitted to them by Her Majesty's Commissioners on the subject of the Decimal Coinage, whether in relation to their own accounts in particular, or regarding it as a question of public expediency, the inconveniences of the change would so far overbalance the advantages contemplated, that the proposed alteration is undesirable."

I am, Sir,

G. S. Lefevre, Esq. Your obedient servant,

THOS. ALEX. HANKEY.

From the COMMITTEE of JOINT STOCK BANKS.

SIR, Lothbury, February 1857.

I HAVE been in consultation with my own Board, as well as the Joint Stock Banks associated with us, on the subject of the proposed introduction of the Decimal Coinage, agreeably to the request of the Commissioners, and probably I cannot give better the general tone of feeling amongst them than by quoting the resolution adopted by the Board of the London and Westminster Bank on the subject :—"Resolved, that it does "not appear that the Board collectively can give any opinion on this difficult subject." Of course I submitted the papers to the various banks, and from their answers I gather that they hardly seem inclined to venture to give any decided opinion on the subject submitted to them. I am under the impression that they have been somewhat led to this course by feeling that the subject is now in excellent hands, being entrusted to a Commission composed of men of high attainments, who have both practical experience as well as scientific knowledge to guide them in the decision to which they are to come.

I may, however, venture to say, that looking at the fact that the Decimal System has many advantages over that now in use, and that it has been adopted by many States, it would appear to be desirable to introduce it into England also, if the change could be effected without producing too great a disturbance in the present mode of monetary computation. On looking through the papers sent to serve as models of the proposed Decimal System, it appears that making the pound the unit has the advantage of being

No. 9. Circular to Bankers.

most in harmony with our present mode of computation, and would therefore cause the least disturbance in making the change, and for that reason be more readily acceptable to the community at large.

I feel I have many apologies to make for the delay in sending this report, but I beg you to believe it has arisen from unavoidable circumstances.

I have the honour to be, Sir,
Your most obedient servant,
DAVID SALOMONS,
Chairman of the Committee
of Joint Stock Banks.

G. S. Lefevre, Esq.,
Assistant Secretary,
Decimal Coinage Commission.

From the BANK OF SCOTLAND.

SIR, Edinburgh, 16th July 1856.

I AM favoured with your letter of the 8th instant, and I have also received a packet of printed papers relative to the proposed Decimal Coinage.

I have forwarded these papers to the Scottish banks as you wish.

You will probably receive direct replies from the different banks, but if any communication for the Commissioners is made to me I will forward it.

I enclose the reply of the Bank of Scotland to the different queries of the Commissioners, and also the copy of a letter which I addressed in 1854 to Sir John Herschell in reply to similar inquiries.

Our opinions remain unaltered. I have received certain information that in a case of book-keeping, in which entries of the same description were made by the two different systems of notation, no advantage was experienced in the use of the Decimal System above that in ordinary use, and you will observe that we not only anticipate such a result, but also positive disadvantage.

The decimal system may be very useful in scientific calculations, and in some particular processes connected with monetary transactions. It seems to us, however, that when no complaint of an existing system is heard, schemes of assimilation should be viewed with considerable doubt and jealousy, and more especially so if they meet with opposition.

I have the honour to be, Sir,
Your obedient servant,
ALEX. BLAIR.

To G. S. Lefevre, Esq.,
Assistant Secretary, Decimal Coinage Commission,
11, Manchester Buildings, London.

ANSWERS to the COMMISSIONERS QUERIES.

BANK OF SCOTLAND.

1st. Is it your opinion that the proposed system will enable bankers to keep their accounts with greater ease and convenience?

1st. As regards labour—no; there being a larger number of figures in the mil system; it will consequently require greater labour.

2nd. Time—no; besides the larger number of figures the summation will be heavier. In a banker's books the columns are generally long, the summation of the shillings and pence, although requiring to be converted, is lighter than that of a like column of three figures in a row.

3rd. Accuracy—in this there appears to be little difference either way; shillings and pence are apt to be misplaced and errors made in conversion. The mils may likewise be placed improperly below each other in the columns.

2nd. The advantages gained in account keeping, by getting rid of the conversion of pence into shillings and shillings into pounds, seems to be the only benefit derivable from the proposed change, and it appears to be confined entirely to book-keeping.

In receiving or paying money at the counter a disadvantage will arise from the high range of figures required to express a very small value; or if coins are introduced carrying so many mils, the mental conversion of them will be more troublesome than that of pence and shillings.

3rd. From the foregoing it is inferred that,—

1st. The facility and accuracy of entering sums are not improved by the proposed change.

2nd. In copying and recopying the labour must be greatly augmented.

3rd. The calling over will be more difficult and occupy longer time.

4th. The present conciseness of expression is more advantageous, both for book-keeping and for counting money, than the Decimal System now under consideration.

5th. In the daily working of a banker's business it is very important that the greatest conciseness of expression be used.

No. 9. Circular to Bankers.

A Decimal System, combining expression as concise as shillings and pence, would perhaps be advantageous in some respects; but the difficulties expected to arise from the system now proposed would overbalance any conveniences derivable from it.

6th. Not desirous of any change so far as this bank's business is concerned.

It is considered very doubtful, in retail transactions, facility, accuracy, and despatch in account keeping and ordinary calculations, both written and mental, would be promoted by a Decimal System; and we are of opinion that if the advantages held out were in a degree realized, yet that the benefit would be much outweighed by the lengthened and extensive trouble and disorder which would accompany the change.

T. A., Cashier.

Bank of Scotland,
16th July 1856.

To Sir JOHN F. W. HERSCHEL, Master of the Royal Mint, London.

SIR,

Bank of Scotland, Edinburgh, 13th December 1854.

I HAVE the honour to acknowledge receipt of your letter of 20th ult., addressed to this bank.

We are of opinion that a Decimal Coinage may not be in itself undesirable, but that in the case of this country, in which a scheme of coinage and a system of accounts are not only established but form so important a part of our national economy, the change would not in any degree compensate for the expense, trouble, and, we fear, prolonged disorder which would accompany it.

In our opinion, therefore, it is neither necessary nor expedient that any change should be attempted.

I do not propose to enter upon the arguments in favour of or against a Decimal System. I shall therefore only observe that we should regret extremely the introduction of any lower denomination of coin than pence into bankers' payments or accounts; and that we should anticipate much confusion and loss from the adoption of any scheme of Decimals with which we are acquainted.

We are not aware that any objection lies against the present florin as a coin, except from its similarity to the half-crown, whereby frequent mistakes occur.

The public in this part of the empire have shown no preference for a Decimal Coinage, actuaries excepted.

From the very inconvenient scarcity of silver we hope that Government will not allow the question of a Decimal System to interpose any delay to a large and increased issue of silver coin of the present denominations.

I may mention that I have had some communication with our Deputy Governor, Sir George Clerk, upon the subject, and that he assents to the inexpediency of any change. I also have permission from Mr. Tooke to send you a copy of a late letter from him stating his opinion, which you will find in favour of the existing system.

I have, &c.

(Signed) ALEX. BLAIR.

To ALEXANDER BLAIR, Esq.

Eastern Bank of Scotland,

SIR, Dundee, 24th July 1856.

I HAVE been favoured with your letter in reference to this matter, with its enclosure.

The little consideration I have been able to give to the question, in regard to its bearing on our business as bankers, inclines me to the opinion that the change proposed in the mode of keeping our accounts from the present clear and simple method to that of the Decimal System is undesirable; and that, if introduced, it would lead to much inconvenience, and, for a time, to great confusion.

It would not economise time or labour, as the number of figures required by the Decimal System would be increased. To prove this, I have made the enclosed extract from one of our customer's accounts, selected at random from our books, made out according to the two systems, and as a fair specimen of a tradesman's account.

Bankers offer great facilities to their customers in the drawing of cheques, which are freely made use of, more particularly since the introduction of the penny stamp; any proposition, therefore, that would tend to increase labour, is much to be deprecated.

I consider the present mode of keeping accounts to be plain, simple, and concise, and that in these respects the adoption of the Decimal System would not be an improvement, the advantage of the latter being more apparent in questions regarding mere calculation

No. 9. Circular to Bankers.

which do not often arise in the daily routine of a banker's business. Coupling this with the proposal of introducing at the same time a Decimal Coinage which, in the practical carrying out of the new system, would entail much mental calculation and labour, as well as increase the risk of making mistakes, I am all the more disinclined to a change, and I do not think it is desired by any considerable section of the community.

I am, &c.

D. SIDEY, Manager.

Bank of Scotland, Edinburgh.

To ALEXANDER BLAIR, Esq., Treasurer, Bank of Scotland.

Edinburgh and Glasgow Bank,
Edinburgh, 16th July 1856.

SIR,

I HAVE to acknowledge receipt of your favour of the 10th instant, enclosing copy of letter from Mr. George S. Lefevre, Assistant Secretary to the Decimal Coinage Commission, with the printed memorandum therein referred to. Having attentively considered the subject, both now and formerly, I beg to state that we are decidedly against the introduction of the Decimal System of notation. But to speak more in detail:

1. We are of opinion that the introduction of such a system would not give the ease and convenience contemplated by its promoters, but, on the contrary, would entail greater labour and trouble in the keeping of our accounts. The conciseness of the present mode of expression is much preferable to the Decimal System, and the new mode would lead to great indefiniteness in idea of value compared with the present.

2. In the table annexed to the printed memorandum, showing the equivalent values in the present system, as compared with that proposed, the number of figures used in the present mode is exaggerated by counting the cyphers put down to represent blanks, while cyphers are never used in our practice.

3. Apart from the greater labour which we anticipate from the introduction of the new system in the keeping of our accounts, we are persuaded that for a very long time to come after the introduction of the measure great trouble would be experienced in explaining the accounts to our customers.

4. From the knowledge we have of the opinions of the public of Scotland generally on this subject, we are satisfied that its introduction would be most unpopular, and would create great confusion and discontent in the transaction of business. The simple introduction of the florin called forth a good deal of feeling, and if the Decimal System were compulsory the public discontent would be very great.

No system has yet been proposed that we would prefer to the present.

It will be obliging if you will communicate this opinion to the Commission along with your own.

I am, &c.

CHA. JAS. KERR, Manager.

No further answers have been as yet received from Scotland.

From the BANK OF IRELAND.

No answer beyond an acknowledgment has as yet been received from the Bank of Ireland or other Irish Banks.

No. 10.

No. 10. Purchases by Poorer Classes.

ANSWER to QUERY as to Prices and Quantities of Articles of Consumption sold to the Poorer Classes.—Circulated by the Commission.

No. 1.

	Present Price.		Highest Price in the Course of last Year.		Lowest Price in the Course of last Year.		Smallest Quantity made up with present Price.
	per lb.	per oz.	per lb.	per oz.	per lb.	per oz.	
Tea, best quality	5/0	0/4	5/0		4/8	0/3½	¼ oz. 0/1
Ditto, second quality, now most sold	4/0	0/3	4/0		3/8	0/2¾	¼ oz. 0/¾
Ditto, third quality, most sold before April last	3/4 to 3/8	0/2½ to 0/2¾	3/4 to 3/8		3/0 to 3/4	0/2½	½ oz. 0/1¼
Ditto, cheapest	3/0	0/2¼	3/0		2/8	0/2	1 oz. 0/2¼
Moist sugar, best quality, very fine	0/5½	½lb. 0/2¾	0/7½	¼lb. 0/2	0/4½	½lb. 0/2¼	¼lb. 0/1¼
Ditto second quality	0/5	¼lb. 0/1¼	0/7	¼lb. 0/1¾			
Ditto, third quality	0/4½	½lb. 0/2¼			0/4	¼lb. 0/1	½lb. 0/2¼
Do. cheapest, good brown	0/4	¼lb. 0/1	0/6½	½lb. 0/3¼	0/3½	½lb. 0/1¾	¼lb. 0/1, 2 oz. 0/0½
Coffee, best quality, very fine	1/8	0/1¼	1/8		1/6	0/1¼	1 oz. 0/1¼
Ditto second, nothing sold much better	1/6	0/1¼	1/6		1/4	0/1	2 oz. 0/2¼
Ditto third, large sale to middle class	1/4	0/1	1/4		1/2	—	1 oz. 0/1, ½ oz. 0/0½
Ditto fourth	1/2	—	1/2		1/0	0/0¾	——
Ditto cheapest, large sale to the poor	1/0	0/0¾	1/0		0/10	2 oz. 0/1¼	2 oz. 0/1½, 1 oz. 0/0¾
Cheese, good, very fine	0/9	¼lb. 0/2¼	0/9		0/9		¼lb. 0/2¼
Ditto, medium	0/8 or 0/7	¼lb. 0/2	0/7 to 0/8		0/7 to 0/8		¼lb. 0/2, 2 oz. 0/1
Ditto, cheapest	0/6	¼lb. 0/1½	0/6		0/5		¼lb. 0/1½
Butter, good, finest	1/2	2 oz. 0/1	1/2		0/11		2 oz. 0/1
Ditto, cheapest	0/10	¼lb. 0/2½	0/10		0/8		¼lb. 0/2½
Pepper, good white	1/8	0/1¼	2/0	0/1½	1/4	0/1	1 oz. 1¼
Ditto, cheapest black	1/2	0/1	1/2	0/1	1/0	0/0¾	2 oz. 0/1¾. 1 oz. 0/1
Rice good	0/4	¼lb. 0/1	0/5	¼lb. 0/1¼	0/3	¼lb. 0/0¾	¼lb. 0/1
Ditto cheapest	0/2	¼lb. 0/0½	0/3	¼lb. 0/0¾	0/1½	¼lb. 0/0½	¼lb. 0/0½

Liverpool,
13th February 1856.

HENRY KIRKHAM,
9, Roe Street, Liverpool.

SIR,

ANY trifling alteration in the first cost of the articles in bond, say from 1*d.* to 2*d.* per lb. on tea, from 1*s.* to 5*s.* per cwt. on coffee, raw, and from 1*s.* to 2*s.* or 3*s.* per cwt. on sugar, would make little or no change in the fixed retail prices, but the articles would be reduced slightly in quality, and the prices keep steady; it is not as in the wholesale market that the same article may be sold at different times to separate parties at different prices, but that different articles are sold at the same price by all parties; for instance, the extent of one man's business over another, and the competition always in the trade induces some tradesmen to give quite the difference named above in a quiet and steady market, hence the retail prices do not change with every turn in the first or wholesale market, but the articles sold at different times and at different shops are not of the same quality.

I hope you will not consider me intruding by offering these few remarks, as I wish to show that the articles are rather accommodated to the price than the price to the articles. Any information I can at any time give you in reference to the Decimal Coinage will be most willingly given by

Your obedient servant,
HENRY KIRKHAM.

A. Smith, Esq.

No. 10. Purchases by Poorer Classes.

No. 2.

	Present Price.		Highest Price in the Course of last Year.		Lowest Price in the Course of last Year.		Smallest Quantity made up with present Price.
	per lb. s. d.	per oz. d.	per lb. s. d.	per oz. d.	per lb. s. d.	per oz. d.	d.
Tea, best quality -	4 8	$3\frac{1}{2}$	4 8	$3\frac{1}{2}$	4 4	$3\frac{1}{4}$	$\frac{1}{2}$ oz $1\frac{3}{4}$
„ 2nd do. - -	4 0	3	4 0	3	3 8	$2\frac{3}{4}$	$\frac{1}{4}$ „ $0\frac{3}{4}$
„ 3rd do. -	3 8	$2\frac{3}{4}$	3 8	$2\frac{3}{4}$	3 4	$2\frac{1}{2}$	$\frac{1}{2}$ „ $1\frac{1}{4}$
„ cheapest - -	2 10	—	2 10	—	2 8	—	$\frac{1}{4}$ lb. $8\frac{1}{2}$
Moist Sugar, best -	0 5	$\frac{1}{4}$lb. $1\frac{1}{4}$	0 7	$\frac{1}{4}$lb. $1\frac{3}{4}$	0 $4\frac{1}{2}$	$\frac{1}{2}$lb. $2\frac{1}{4}$	$\frac{1}{4}$ „ $1\frac{1}{4}$
„ 2nd -	0 $4\frac{1}{2}$	$\frac{1}{2}$lb. $2\frac{1}{4}$	—	—	0 4	$\frac{1}{4}$lb. 1	—
„ cheapest -	0 4	$\frac{1}{4}$lb. 1	0 6	$\frac{1}{4}$lb. $1\frac{1}{2}$	0 $3\frac{1}{2}$	$\frac{1}{2}$lb. $1\frac{3}{4}$	$\frac{1}{4}$ „ 1
Coffee, best quality -	1 8	$1\frac{1}{4}$	1 8	$1\frac{1}{4}$	1 8	$1\frac{1}{4}$	1 oz. $1\frac{1}{4}$
„ 2nd - -	1 6	—	1 6	—	1 6	—	—
„ 3rd - -	1 4	1	1 4	1	1 4	1	1 „ 1
„ cheapest -	1 0	$0\frac{3}{4}$	1 0	$0\frac{3}{4}$	1 0	$\frac{3}{4}$	1 „ $0\frac{3}{4}$
Pepper, good - -	1 4	1	1 4	1	1 4	1	1 „ 1
Rice, good - -	0 4	$\frac{1}{4}$lb. 1	0 4	$\frac{1}{4}$lb. 1	0 4	$\frac{1}{4}$lb. 1	$\frac{1}{4}$ lb. 1
„ cheapest - -	0 2	$\frac{1}{2}$lb. 1	0 2	$\frac{1}{2}$lb. 1	0 2	$\frac{1}{2}$lb. 1	$\frac{1}{2}$ „ 1

Frederick Wells Strugnell.
109, Edgware Road.

109, Edgware Road, Feb. 15, 1856.

Sir,

Perhaps some little explanation to the enclosed is necessary. The necessities of the poor make them keen calculators, so that when prices cannot be divided without a fractional loss to them, they avoid them, if possible, either by selecting a higher or a lower price, and such is the competition among tradesmen that they will submit to a temporary loss, in order to make a popular price, for no price that cannot be divided without a fractional loss to the small consumer can long be sustained; for instance, generally the leading prices among them are 4*s.* for tea, 1*s.* 4*d.* for coffee, and 4*d.* for sugar.

I have, &c.,

A. Smith, Esq. F. W. Strugnell.

P.S. Where the smaller quantities are not carried out, they are rarely sold.

Statement furnished to the Commissioners by Messrs. Dawbarn and Sons, Grocers and Drapers, Wisbeach.

Number of Customers.

	Not exceeding 6*d.*	Above 6*d.* and not exceeding 1*s.*	Above 1*s.* and not exceeding 2*s.* 6*d.*	Above 2*s.* 6*d.* and not exceeding 5*s.*	Above 5*s.* and not exceeding 10*s.*	Above 10*s.*	Total Customers.	Total Amount.
December 22, 1855.								£ s. d.
Grocery - -	34	37	76	55	58	30	290	
Drapery - -	52	62	85	68	41	49	357	
	86	99	161	123	99	79	647	157 5 4
February 9, 1856.								
Grocery - -	24	24	41	47	23	12	171	
Drapery - -	51	44	98	53	33	48	327	
	75	68	139	100	56	60	498	116 18 8
March 1, 1856.								
Grocery - -	33	30	64	27	23	13	190	
Drapery - -	62	44	93	51	34	41	325	
	95	74	157	78	57	54	515	103 5 $2\frac{1}{2}$

No. 10. Purchases by Poorer Classes.

1855. DRAPERY.

Number of Customers.	Amount.			Number of Customers.	Amount.			Number of Customers.	Amount.			Number of Customers.	Amount.		
	£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.
334	67	10	9	431	100	19	2	373	64	4	2	391	100	19	0
342	69	5	9	405	98	11	7	368	52	19	2	354	92	8	2
351	52	15	9½	378	83	2	9	356	62	1	4	350	100	11	2
338	65	7	3	399	100	15	8	418	70	9	1	353	114	10	8
303	54	5	2	389	103	17	3	390	65	13	6	411	90	6	7
365	67	6	11½	394	82	2	1	296	51	1	0	305	72	12	2
349	78	11	8	418	123	7	2	256	44	4	2	367	90	11	2
295	57	19	9	377	73	1	4	223	39	4	0	311	64	5	10
305	50	5	11	414	88	0	0	285	78	2	9	300	72	5	5
356	73	15	0	391	81	17	7	338	73	11	6	366	92	10	3
331	62	13	5	385	63	9	1	316	82	2	1	286	58	11	9
367	76	16	1	382	62	12	6	408	119	7	0				
346	77	14	4	390	84	7	3	420	122	7	8	18,506	4018	0	1
390	79	10	6	340	62	18	9								

Average of each Customer, 4*s.* 4*d.*, or ·21712.

1855. GROCERY.

Number of Customers.	Amount.			Number of Customers.	Amount.			Number of Customers.	Amount.			Number of Customers.	Amount.		
	£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.
154	26	8	6	161	31	5	8	149	27	18	11½	165	32	10	6
164	26	4	5½	154	29	5	9	132	32	13	3	170	31	10	6
157	25	12	10½	192	26	19	3	138	33	10	6	157	30	3	4
155	24	14	10	159	28	7	8	152	29	14	6	168	40	7	7
141	22	14	0	155	28	11	4	129	30	12	8	159	43	0	2½
162	24	18	5	158	27	10	10	106	29	18	11	143	28	11	10
145	24	18	10	157	25	9	10	134	26	4	4	153	29	9	8
141	22	13	0	144	23	18	2	115	24	18	0	148	25	15	2
119	16	5	6	164	29	7	6	133	31	9	7	188	45	4	3
152	27	10	3	197	35	1	5	151	36	4	8	295	64	15	1
141	28	3	8	178	29	3	3	141	30	19	0	154	31	17	0
143	31	3	11	152	27	0	8	184	37	0	8				
157	28	4	4	140	27	9	8	210	39	1	6	8,147	1570	8	1
189	30	9	10	142	27	3	0								

Average of each Customer, 3*s.* 10¼, or ·19275.

1855.	GROCERY. Number of Customers.	GROCERY. Amount.	DRAPERY. Number of Customers.	DRAPERY. Amount.
January - -	1,342	£210 12 2	2,965	£828 14 8
February - -	1,192	194 16 4	4,393	728 13 4
March - -	1,409	252 4 7	5,183	926 1 11
April - -	1,441	228 0 6	5,481	1,068 2 11
May - -	1,442	237 16 1	6,050	1,220 17 7
June - -	1,633	263 0 2	6,137	1,046 19 1
July - -	1,297	254 1 11	5,198	799 16 3½
August - -	1,244	278 16 9	5,211	748 17 4½
September -	1,431	277 0 2	4,627	880 9 10½
October - -	1,533	283 11 8	5,856	1,256 4 10½
November -	1,322	286 7 11	5,511	1,166 0 5
December - -	1,732	320 15 0	4,906	933 15 8
Total -	17,018	£3,087 3 3	61,518	£11,604 14 0

Average of each Customer,—Grocery, 3*s.* 7½*d.*, or ·1814 Drapery, 3*s.* 9¼*d.*, or ·1886.

No. 11.

DECIMAL COINAGE.—No. 1.

AN ACCOUNT of the NET PUBLIC INCOME of the UNITED KINGDOM of GREAT BRITAIN AND IRELAND in the Year ended the 31st Day of December 1855 (after abating the Expenditure thereout defrayed by the several Revenue Departments), and of the ACTUAL ISSUES or PAYMENTS within the same Period, *exclusive of the Sums applied to the Redemption of Funded or paying off Unfunded Debt*, and of the Advances and Repayments for Local Works, &c.

INCOME.	TOTAL. £ s. d.
CUSTOMS	20,987,752 7 9
EXCISE	16,389,486 3 0
STAMPS	6,805,604 18 0
TAXES (Land and Assessed)	2,945,784 4 1
PROPERTY TAX	13,718,185 5 2
POST OFFICE	1,137,219 8 5
CROWN LANDS	280,515 15 9
PRODUCE of the SALE of OLD STORES, and other extra RECEIPTS	522,138 9 7
MONEY received from the EAST INDIA COMPANY	60,000 0 0
MISCELLANEOUS RECEIPTS including Imprest and other Monies	402,768 18 10
UNCLAIMED DIVIDENDS (received)	115,149 12 1
£	63,364,605 2 8
EXCESS of Expenditure over Income in the Year ended 31st December 1855	21,141,183 8 1
£	84,505,788 10 9

EXPENDITURE.	£ s. d.	£ s. d.
INTEREST and Management of the Permanent Debt	22,792,594 4 11*	
Unclaimed Dividends paid	173,240 17 5	
Terminable Annuities	3,868,293 5 11	
Interest of Exchequer Bonds, 1854	217,000 0 0*	
Interest of Exchequer Bills, Supply	560,635 4 9	
Ditto Deficiency	9,386 5 0	
Ditto Ways and Means	26,749 13 9	
		27,647,899 11 9
CHARGES on CONSOLIDATED FUND:		
Civil List	396,570 0 0	
Annuities and Pensions	340,991 14 8	
Salaries and Allowances	162,697 7 3	
Diplomatic Salaries and Pensions	149,244 13 10	
Courts of Justice	493,082 18 10	
Miscellaneous Charges on the Consolidated Fund	182,118 16 6	
		1,724,705 11 1
SUPPLY SERVICES:		
Army	14,545,059 0 0	
Navy	19,014,708 0 0	
Ordnance	9,632,290 0 1	
Vote of Credit (additional Expenses, War with Russia)	5,200,000 0 0	
Miscellaneous Civil Services	6,741,126 7 10	
		55,133,183 7 11
£		84,505,788 10 9

	£ s. d.
* Excluding Interest on Donations and Bequests	19,557 11 3
And including Sinking Fund, 15 & 16 Vict. c. 23. £6,906 14 7	
And Interest on Exchequer Bonds, A.D. 1853 £11,503 5 0	
	18,409 19 7

93 Figures of Shillings and Pence.

No. 2.

AN ACCOUNT of the NET PUBLIC INCOME and EXPENDITURE of the UNITED KINGDOM for the Year ended 31st December 1855, in Pounds, Florins, Cents, and Mils.

INCOME.	TOTAL.
	£ f.c.m.
CUSTOMS	20,987,752·388 [+3/6]
EXCISE	16,389,486·150
STAMPS	6,905,604·900
LAND and ASSESSED TAXES	2,945,784·204 [−1/6]
PROPERTY TAX	13,718,185·258 [−2/6]
POST OFFICE	1,137,219·421 [+1/6]
CROWN LANDS	280,515·788 [+3/6]
SALE OF OLD STORES, &c.	522,138·479 [−1/6]
EAST INDIA COMPANY	60,000
MISCELLANEOUS RECEIPTS	402,768·942 [+2/6]
UNCLAIMED DIVIDENDS received	115,149·604 [−1/6]
£	63,364,605·134 [+4/6]
EXCESS of EXPENDITURE over INCOME in the YEAR ended 31st December 1855	21,141,183·406 [+11/6]
£	84,505,788·540 [+15/6]

EXPENDITURE.	£ f.c.m.	£ f.c.m.
INTEREST of PERMANENT DEBT	22,792,594·246 [+1/6]	
Unclaimed Dividends paid	173,240·871 [+1/6]	
Terminable Annuities	3,868,293·296 [+1/6]	
Interest on Exchequer Bonds, 1854	217,000	
Do. Bills, Supply	560,635·238 [+3/6]	
Do. „ „ Deficiency	9,386·250	
Do. „ „ Ways and Means	26,749,688 [3/6]	
		27,647,899·589 [+3/6]
CHARGES on CONSOLIDATED FUND:		
Civil List	396,570	
Annuities and Pensions	340,991·733 [−2/6]	
Salaries and Allowances	162,697·363 [+3/6]	
Diplomatic Salaries and Pensions	149,244·692 [+2/6]	
Courts of Justice	493,082·942 [+2/6]	
Miscellaneous Charges	182,118·825	
		1,724,705·555 [+5/6]
SUPPLY SERVICES:		
Army	14,545,059	
Navy	19,014,708	
Ordnance	9,632,290·004 [−1/6]	
Vote of Credit (War Expenses)	5,200,000	
Miscellaneous Civil Services	6,741,126·392 [+2/6]	
		55,133,183·396 [+1/6]
£		84,505,788·540 [+15/6]

Being 90 Figures of Decimals.

NOTE.—The fractions in brackets mark the surplus or deficiency between this account and the corresponding account in £ *s. d.*

No. 12.

A Commercial Account between New York and Liverpool, in the Present and Decimal Systems.

Dr. PRESENT SYSTEM. Cr.

—	—	—	Interest Columns.			—	—	—	—	Interest Columns.			—
1839.		£ s. d.	1839.	Days.	£ s. d.	£ s. d.	1839.		£ s. d.	1839.	Days.	£ s. d.	£ s. d.
June 29	To balance brought down	7,752 3 11	June 30	184	195 7 11	7,752 3 11	July 17	By 1 bill per Brown Bros. & Co. - -	229 11 4	Sept. 18	104	3 5 6	229 11 4
July 2	Transfer per Crafts & Stell - -	1,278 4 3	Nov. 2	59	10 6 7	1,278 4 3	„ 22	Pt. do. - -	303 18 2	„ 23	99	4 2 5	303 18 2
„ „	Do. do. -	326 0 1	Oct. 21	71	3 3 5	326 0 1	Aug. 5	Pt. bill do. - -	320 16 6	Oct. 7	85	3 14 9	320 16 6
„ „	Do. do. -	2,426 17 6	Nov. 5	56	18 17 9	2,462 17 6	„ „	Pt. do. do. -	200 18 4	„ „	85	2 6 9	200 18 4
„ 5	1 draft per Coates & Co. - -	185 0 0	„ 7	54	1 7 4	185 0 0	„ 16	1 do. do. - -	208 18 4	„ 17	75	2 2 11	208 18 4
„ 9	Transfer per Crafts & Stell - -	1,068 12 6	„ 9	52	7 12 3	1,068 12 6	Sept. 4	Transfer per do. -	353 15 8	June 30	184	8 18 5	353 15 8
„ 8	1 draft per W. B. Huggins & Co. -	500 0 0	„ 4	57	3 18 1	500 0 0	Oct. 5	Pt. bill do. -	4,824 2 10	Dec. 7	24	15 17 2	4,824 2 10
„ 11	Do. do. -	600 0 0	„ 8	53	4 7 1	600 0 0	„ 16	Do. do. do. - -	1,102 11 11	„ 19	12	1 16 3	1,102 11 11
„ 16	Transfer per Crafts & Stell - -	340 3 8	„ 15	46	2 2 10	340 3 8	Nov. 6	Do. do. do. -	5,820 14 4	1840. Jan. 8	*8*	*6 7 6*	5,820 14 4
„ 20	Do. do. -	559 2 2	„ 24	37	2 16 8	559 2 2	„ „	Do. do. do. - -	340 3 8	„ 8	*8*	*0 7 5*	340 3 8
„ 25	Do. do. -	676 7 7	„ 27	34	3 3 0	676 7 7	„ 7	Received do. cash -	600 0 0	1839. Nov. 7	54	4 8 9	600 0 0
Aug. 10	Do. do. -	514 9 8	Dec. 9	22	1 11 0	514 9 8	„ 15	Pt. bill do. - -	559 2 2	1840. Jan. 17	*17*	*1 6 0*	559 2 2
„ 14	Do. do.	190 13 7	„ 15	16	0 8 4	190 13 7	„ 20	1 do. do. -	676 7 7	„ 22	*22*	*2 0 9*	676 7 7
„ 21	Do. do. -	145 18 10	„ 20	11	0 4 5	145 18 10	„ „	Transfer do. -	171 10 0	1839. June 30	184	4 6 5	171 10 0
Dec 2	Do. do. -	629 13 8	April 2	*93*	*8 0 6*	629 13 8				1840.			
„ 31	Interest Contra - -	- -	- -	-	13 11 0		„ 25	Pt. bill do. -	514 9 8	Jan. 27	*27*	*1 18 0*	514 9 8
„ „	Commission on 9,477*l.* 3*s.* 6*d.* at 1 per cent. - -	94 15 5					Dec. 2	Do. do. do. -	145 18 10	Feb. 3	*34*	*0 13 7*	145 18 10
							„ „	Do. do. do. -	190 13 7	„ 3	*34*	*0 17 9*	190 13 7
„ „	Do. 15,438*l.* 7*s.* 3*d.* at $\frac{3}{8}$ per cent. -	57 17 10					„ 31	Interest per contra -	- -	- -	-	8 0 6	
„ „	Charges account -	115 8 4					„ „	Balance of interest -	- -	- -	-	209 17 10	
„ „	Postages - -	4 16 5					„ „	Do. carried down -	1,148 10 4	- -	-	- -	1,148 10 4
„ „	Interest - -	209 17 10	- -	-	- -	482 15 10							
		17,712 3 3	- -	-	268 17 8	17,712 3 3			17,712 3 3			268 17 8	17,712 3 3
1839. Dec. 31	To balance brought down	1,148 10 4	Dec. 31	-	- -	1,148 10 4	Dec. 31	By balance carried to Ledger No. 2, fol. 1230	1,148 10 4	1839. Dec. 31		- -	1,148 10 4

DECIMAL SYSTEM.

Dr. Cr.

—	—	—	Interest Columns.			—	—	—	—	Interest Columns.			—
1839.		£ fls. mls.	1839.	Days.	£ fls. mls.	£ fls. mls.	1839.		£ fls. mls.	1839.	Days.	£ fls. mls.	£ fls. mls.
June 29	To balance brought down	7,752 1 96	June 30	184	195 3 96	7,752 1 96	July 17	By 1 bill per Brown Bros. & Co. - -	229 5 67	Sept. 18	104	3 2 75	229 5 67
July 2	Transfer per Crafts & Stell - -	1,278 2 12	Nov. 2	59	10 3 29	1,278 2 12	„ 22	Pt. do. - -	303 9 08	„ 23	99	4 1 21	303 9 08
„ „	Do. do. -	326 0 04	Oct. 21	71	3 1 71	326 0 04	Aug. 5	Pt. bill do. - -	320 8 25	Oct. 7	85	3 7 37	320 8 25
„ „	Do. do. -	2,462 8 75	Nov. 5	56	18 8 87	2,462 8 75	„ „	Pt. do. do. - -	200 9 16	„ „	85	2 3 38	200 9 16
„ 5	1 draft per Coates & Co. - -	185 0 0	„ 7	54	1 3 67	185 0 0	„ 16	1 do. do. - -	208 9 16	„ 17	75	2 1 46	208 9 16
„ 9	Transfer per Crafts & Stell - -	1,068 6 25	„ 9	52	7 6 12	1,068 6 25	Sept. 4	Transfer per do. -	353 7 83	June 30	184	8 9 21	353 7 83
„ 8	1 draft per W. B. Huggins & Co. -	500 0 0	„ 4	57	3 9 04	500 0 0	Oct. 5	Pt. bill do. - -	4,824 1 42	Dec. 7	24	15 8 58	4,824 1 42
„ 11	Do. do. -	600 0 0	„ 8	53	4 3 54	600 0 0	„ 16	Do. do. do. -	1,102 5 96	„ 19	12	1 8 12	1,102 5 96
„ 16	Transfer per Crafts & Stell - -	340 1 83	„ 15	46	2 1 42	340 1 83	Nov. 6	Do. do. do. - -	5,820 7 17	1840. Jan. 8	*8*	*6 3 75*	5,820 7 17
„ 20	Do. do. -	559 1 08	„ 24	37	2 8 33	559 1 08	„ „	Do. do. do. -	340 1 83	„ 8	*8*	*0 3 71*	340 1 83
„ 25	Do. do. -	676 3 79	„ 27	34	3 1 50	676 3 79	„ 7	Received do. cash -	600 0 0	1839. Nov. 7	54	4 4 37	600 0 0
Aug. 10	Do. do. -	514 4 83	Dec. 9	22	1 5 50	514 4 83	„ 15	Pt. bill do. -	559 1 08	1840 Jan. 17	*17*	*1 3 0*	559 1 08
„ 14	Do. do. -	190 6 79	„ 15	16	0 4 17	190 6 79	„ 20	1 do. do. - -	676 3 79	„ 22	*22*	*2 0 37*	676 3 79
„ 21	Do. do. -	145 9 42	„ 20	11	0 2 21	145 9 42				1839.			
Dec. 2	Do. do. -	629 6 83	April 2	*93*	*8 0 25*	629 6 83	„ „	Transfer do. -	171 5 0	June 30	184	4 3 21	171 5 0
„ 31	Interest Contra -	- -	- -	-	13 5 50					1840.			
„ „	Commission on 9,477*l.* 1*f.* 75*mls.* at 1 per cent. - -	94 7 71					„ 25	Pt. bill do. -	514 4 83	Jan. 27	*27*	*1 9 0*	514 4 83
							Dec. 2	Do. do. do. -	145 9 42	Feb. 3	*34*	*0 6 79*	145 9 42
„ „	Do. 15,438*l.* 3*f.* 62*mls.* at $\frac{3}{8}$ per cent. -	57 8 91					„ „	Do. do. do. -	190 6 79	„ „	*34*	*0 8 88*	190 6 79
							„ 31	Interest per contra -	- -	- -	-	8 0 25	
„ „	Charges account -	115 4 17					„ „	Balance of interest -	- -	- -	-	209 8 92	
„ „	Postages - -	4 8 21					„ „	Do. carried down -	1,148 5 17	- -	-	- -	1,148 5 17
„ „	Interest - -	209 8 92	- -	-	- -	482 7 92							
		17,712 1 61	- -		268 8 83	17,712 1 61	1839.		17,712 1 61			268 8 83	17,712 1 61
1839.			1839.				Dec. 31	By balance carried to Ledger No. 2, fol. 1230	1,148 5 17	1839. Dec. 31		- -	1,148 5 17
Dec. 31	To balance brought down	1,148 5 17	Dec. 31		- -	1,148 5 17							

N.B.—This account is made out to the 31st December, and the interest on such drafts on the debit side as are not then due become a credit, and, *vice versâ*, those on the credit side become a debit. Such drafts are marked with red ink [*italic in print*], and charged and credited interest per contra.

No. 13.
Decimal Bullion Weights.

No. 13.

DECIMAL BULLION WEIGHTS.

LETTER from THOMSON HANKEY, Esq. to LORD MONTEAGLE.

MY DEAR LORD MONTEAGLE, Bank of England, 10th January 1856.

I CAN only find one report made to me, as Governor of the Bank, by Mr. Miller, who attended at that time particularly to the department of the Cashier's Office in connection with our Bullion Office, relating to the then proposed change of weights from the subdivisions of the troy pound to the decimal fractions of the troy ounce. I send you a copy of this report. The change was made, as you are I believe aware, because I had ascertained beyond all question that our old system of calculation was a very complicated one, and could be greatly simplified; the change was not made, however, without a great deal of discussion and consideration, but this was carried on verbally between the various authorities whom I consulted, either direct or through Mr. Miller, and I have no record of any proceedings which would be of the smallest use to you, excepting the one I enclose.

Fortunately, I had to deal with men of ability, and who were singularly free from prejudice; and it was owing to them, and not owing to any merit on my part, that a change was effected, against which I have never since heard a single objection raised.

I am, &c.

The Lord Monteagle. (Signed) THOMSON HANKEY.

MEMORANDUM AND REPORT on the BULLION WEIGHTS of the BANK of ENGLAND.

February 28, 1852.

IT is the opinion of most persons connected with the bullion trade that a great saving of time and labour would be effected if the Bank were to use only weights of the troy ounce instead of the present weights of pounds, oz., dwts., and grs.

Such a change would render the accounts of English merchants, in reference to bullion transactions, more easily understood in other countries where the decimal system has been adopted.

The change would greatly simplify all the calculations to be made in assaying, melting, reducing the gross weight of bullion to the standard weight, &c., and would greatly facilitate all the transactions between the Mint and the Bank, as well as between the Bank and the public.

The change might be made without the least disturbance or trouble to the public. It would be in accordance with the recommendations of the Commission on Weights and Measures, and would not, so far as can be ascertained, be opposed to any law.

(Signed) W. MILLER.

Mr. Miller has consulted Sir John Lubbock, Sir John Herschel, and Mr. Shaw Lefevre, who are all members of the present Commission on Weights and Measures. They none of them see any reason why the proposed change should not be carried out by the Bank and the Mint, nor are they aware of any legal obstruction.

The Government Inspector of Weights and Measures at Whitehall, the City of London inspector, and an officer of the Founders' Company, which company is empowered by old Acts of Parliament still in force to legalise weights and measures, have all been consulted, and none of them are aware of any impediment in the way to the proposed alterations.

Sir J. Herschel has caused new weights to be prepared for the Mint by the same person who made the Bank weights, and has made the other arrangements, in conjunction with Captain Harness, for carrying out the proposition.

The Bank melters, Messrs. Browne and Wingrove, have also provided themselves with new weights, and are prepared to accommodate themselves to the change.

Mr. Miller has prepared the tables necessary for the standarding both for gold and silver. The gold tables are ready for use. The silver have just been corrected for the press, and will be ready in a few days.

It should be observed, that the class of persons engaged in the bullion trade are an educated class, familiar with calculations, whose calculations are generally made in the decimal form, and that they are a class best of all able to meet any little difficulty which a change of this nature is likely to bring with it.

Mr. Freshfield thinks that the legal question is one never likely to be raised, and if it were, he is of opinion that the law would be found to be on the side of the change.

(Signed) W. MILLER.

October 6, 1852.

No. 13. Decimal Bullion Weights.

The Series of Troy Weights provided for the use of Her Majesty's Exchequer in pursuance of the Act 16 Vict. c. 29. is as follows, viz. :—

Ounces.	
500	Multiples of the ounce.
400	
300	
200	
100	
50	
40	
30	
20	
10	
5	
4	
3	
2	
1 oz. the unit or standard.	
0·5	Decimal parts of the ounce.
0·4	
0·3	
0·2	
0·1	
0·05	
0·04	
0·03	
0·02	
0·01	
0·005	
0·004	
0·003	
0·002	
0·001	

No. 14.

No. 14. Calculation of Dividends.

BANK OF ENGLAND.

Paper showing the Calculation of Dividends and Duty carried to Decimals of One Penny.

MY LORD, Bank of England, 8th April 1856.

I HAVE the honour to transmit to your Lordship the following papers :—

No. 1. A transcript of a page of the Consols Dividend Books.

No. 2. The totals of the A. section of the same.

No. 3. The making up of the A. to C. section of the same.

No. 4. The grand total of all the sections.

No. 5. The page of the Dividend Book "No. 1" stated decimally.

This last statement is at the same time the whole of the working. There was no table nor any other piece of paper used in its production, but the figures were set down just as they appear. It is the actual rough statement. There are several erasures, but most of them are due to the scratching out of the printed red line to adapt the form to the decimal mode of statement.

I believe that this must have been worked in much less time, perhaps one third, than the original statement done in the old mode. There are more figures in this, but there need not have been nearly so many, as the duty column here is quite useless, being a mere repetition of the "Principal," and twice the number of figures must have been employed in working out the original, even with the assistance of the tables employed.

I have, &c.

The Right Hon. Lord Monteagle, &c. &c. &c.

WM. MILLER.

No. 14. Calculation of Dividends.

No. 1.

207th Dividend, 5th January 1856. Consolidated 3*l.* per Cent. Annuities.

	For Signature of Proprietors.	Folio of Ledger.	Christian and Surname of Proprietors, viz.—	Principal. £	s.	d.	Interest. £	s.	d.	Dec. fracs. of a Penny.	Duty. £	s.	d.	Fracs. 480ths of a Penny.	Nett. £	s.	d.
1			John Brown	250,000	0	0	3,750	0	0		250	0	0		3,500	0	0
2			James Smith	163,677	1	1	2,455	3	1	395	163	13	6	07	2,291	9	7
3			Edward Thompson	131,227	4	6	1,968	8	2	01	131	4	6	08	1,837	3	8
4			William Jones and	100,000	0	0	1,500	0	0		100	0	0		1,400	0	0
5			Henry Williams	97,043	8	8	1,455	13	0	36	97	0	10	06	1,358	12	2
6			&c. &c.	88,847	4	10	1,332	14	2	07	88	16	11	05	1,243	17	3
7				81,000	0	0	1,215	0	0		81	0	0		1,134	0	0
8				74,953	16	0	1,124	6	1	680	74	19	0	13	1,049	7	1
9				72,868	19	8	1,093	0	8	340	72	17	4	08	1,020	3	4
10				66,000	0	0	990	0	0		66	0	0		924	0	0
11				65,236	13	3	978	10	11	985	65	4	8	11	913	6	3
12				60,600	17	2	909	0	3	09	60	12	0	03	848	8	3
13				60,395	6	10	905	18	7	23	60	7	10	13	845	10	9
14				60,000	0	0	900	0	0		60	0	0		840	0	0
15				60,000	0	0	900	0	0		60	0	0		840	0	0
16				60,000	0	0	900	0	0		60	0	0		840	0	0
17				59,900	5	4	898	10	0	96	59	18	0		838	12	0
18				57,500	0	0	862	10	0		57	10	0		805	0	0
19				52,468	0	5	787	0	4	875	52	9	4	04	734	11	0
20				49,081	3	0	736	4	4	14	49	1	7	07	687	2	9
21				42,955	16	9	644	6	9	015	42	19	1	06	601	7	8
22				40,000	0	0	600	0	0		40	0	0		560	0	0
23				40,000	0	0	600	0	0		40	0	0		560	0	0
24				39,961	13	2	599	8	5	97	39	19	2	11	559	9	3
25				37,994	2	7	569	18	2	865	37	19	10	08	531	18	4
				1,911,711	13	3	28,675	12	11	985	1,911	13	7		26,763	19	4
									6				7	05			

No. 2.

A. Consol Totals.

——	Principal. £	s.	d.	Interest. £	s.	d.	Fractions. £	s.	d.	Dec. fracs. of a Penny.	Duty. £	s.	d.	Fractions. £	s.	d.	Fracs. 480ths of a Penny.	Nett. £	s.	d.
Assessed at 1*s.* 4*d.*	48,592,029	15	6	728,876	19	5	3	9	6	19	48,588	7	3	3	8	8	256	680,288	12	2
„ 11½*d.*	38,219	18	1	573	5	6	0	0	5	655	27	8	9	0	0	7	318	545	16	9
Exempt - -	450,753	3	11	6,760	19	7	0	6	4	505								6,760	19	7
Non-assessed -	75,823	15	7	1,136	9	2	0	17	11	605								1,136	9	2
	49,156,826	13	1	737,347	13	8	4	14	3	955	48,615	16	0	3	9	4	574	688,731	17	8
																1	094			

No. 3.

207th Dividend Consolidated 3*l.* per Cent. Annuities, 5th January 1856.

—	Principal. £	s.	d.	Interest. £	s.	d.	Fractions. £	s.	d.	Dec. fracs. of a Penny.	Duty. £	s.	d.	Fractions. £	s.	d.	Fracs. 480ths of a Penny.	Nett. £	s.	d.
A -	49,156,826	13	1	737,347	13	8	4	14	3	955	48,615	16	0	3	9	4	094	688,731	17	8
Ba -	12,640,902	14	0	189,608	9	1	5	1	8	72	12,118	5	3	3	19	1	404	177,490	3	10
Be/i -	10,778,804	3	7	161,677	5	4	4	15	11	045	10,369	8	6	3	13	8	453	151,307	16	10
Bo/u -	15,029,985	7	7	225,308	11	4	6	4	3	365	14,366	0	9	4	16	2	265	210,942	10	7
Ca/e -	13,293,204	0	1	199,392	14	6	5	6	8	415	12,754	18	7	4	3	5	255	186,637	15	11
Ci/u -	25,003,954	17	8	375,052	8	6	6	17	11	58	14,741	13	5	5	4	9	134	360,310	15	1
	125,894,677	16	0	1,888,387	2	5	33	0	11	080	112,966	2	6	25	6	8	165	1,775,420	19	11

No. 4.

207th Dividend Consolidated 3*l.* per Cent. Annuities, 5th January 1856.

No. 14. Calculation of Dividends.

Principal.			Interest.			Fractions.				Duty.			Fractions.				Nett.		
									Dec. fracs. of a Penny.							Fracs. 480ths of a Penny.			
£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*		£	*s.*	*d.*	£	*s.*	*d.*		£	*s.*	*d.*
380,423,934	4	11	5,706,215	18	6	143	1	9	285	356,245	6	3	109	8	1	276	5,349,970	12	3

No. 5.

Consolidated 3*l.* per Cent. Annuities.

—		Interest.			Duty.			Nett.			—
£	Mils.	£	Mils.	Dec. Fracs.	£	Mils.	Dec. Fracs.	£	Mils.	Dec. Fracs.	
250,000		3,750			250			3,500			121326
163,677	055	2,455	155	825	163	677	055	2,291	478	77	121327
131,227	225	1,968	408	375	131	227	225	1,837	181	15	121328
100,000		1,500			100			1,400			121329
97,043	435	1,455	651	525	97	043	435	1,358	608	09	121330
88,847	24	1,332	708	6	88	847	24	1,243	861	36	121331
81,000		1,215			81			1,134			121332
74,953	8	1,124	307		74	953	8	1,049	353	2	121333
72,868	985	1,093	034	775	72	868	985	1,020	165	79	121334
66,000		990			66			924			121335
65,236	66	978	549	9	65	236	66	913	313	24	121336
60,600	855	909	012	825	60	600	855	848	411	97	121337
60,395	34	905	930	1	60	395	34	845	534	76	121338
60,000		900			60			840			121339
60,000		900			60			840			121340
60,000		900			60			840			121341
59,900	265	898	503	975	59	900	265	838	603	71	121342
57,500		862	5		57	5		805			121343
52,468	02	787	020	3	52	468	02	734	552	28	121344
49,081	15	736	217	25	49	081	15	687	136	1	121345
42,955	835	644	337	525	42	955	835	601	381	69	121346
40,000		600			40			560			121347
40,000		600			40			560			121348
39,961	655	599	424	825	39	961	655	559	463	17	121349
37,994	125	569	911	875	37	994	125	531	917	75	121350
1,911,711	645	28,675	674	675	1,911	711	645	26,763	956		
										7·03	Fractions that could not be paid.

No. 15.

Memorandum on the Introduction of the Decimal System of Weights into the Customs Department.

No. 15. Decimal Weights in Customs.

It is thirteen years since the Decimal System by weight was brought into active operation in the Customs' waterside business, at which time the pound avoirdupoise was divided into 100 parts, and by the Honourable Commissioners' Minute, dated 31st January 1843, ordered to be adopted by the service, in order to ascertain the allowances to be made on account of the tare of silk manufactures imported from Europe, the weights previously in use for this purpose being ounces, half ounce, and quarter ounce.

Silk ribbons and broad stuffs are charged with duty by weight, the duty being graduated according to the description of manufacture; at the period mentioned, gauze being assessed with the duty of 27*s.* 6*d.* per pound, and plain silk or satin, which are the commonest description of silk goods, being charged 11*s.* per pound.

Ribbons form the bulk of the importation on which it was difficult to determine the proper allowance to be made on account of tare. They are imported in cases, weighing, exclusive of the case, from five to six hundredweight each, from one third to two thirds of which weight is composed of tare, consisting of pasteboard boxes, in which the ribbons are packed, and the cylinders of pasteboard or wood on which they are rolled. These boxes and cylinders are of many varieties of size and weight; and in order to preserve the merchantable appearance of such delicate and fancy articles, it is essential to ascertain the tare by the smallest possible disturbance of the fabrics, and, therefore, a box and one or more cylinders of each variety being divested of the ribbon, are weighed in the nicest possible manner, quarter of an ounce, as stated, being the smallest weight used; and the weight so ascertained is used as the tare by which to calculate the total tare for any given variety of boxes and cylinders, the tare on all the different varieties, in any particular case, being ascer-

No. 15. Decimal Weights in Customs.

tained in the same manner, which, when added together, form the total tare which, deducted from the gross, form the total net weight on which the importer is required to pay duty. It is, however, manifest that in weighing so small a section as a base by which to calculate the total weight to be allowed, the scale moreover being allowed to prepctn-derate in favour of the importer, the accuracy with which the weight of the selected portions were ascertained would be of the utmost importance in a revenue point of view, because, whether a given section be deemed to weigh a quarter of an ounce, more or less, would, when used as the basis for calculation, make a difference of many pounds weight for or against the revenue, and vice versâ to the importer, in the total tare of a given package; added to which, the multiplied complex fractional calculation to be made in every operation considerably impeded the waterside business, prevented the interchange of officers, and in a great measure prohibited the checking of the accounts.

The foregoing considerations led to the division of the pound weight into 100 parts, the weights used being parts 50, 30, 20, 10, 5, 3, 2, 1, by means of which the mtnute sections of tare were weighed to the hundredth part of a pound, instead of the sixy-fourth part as formerly; thus bringing into operation a weight one half part more minute than the quarter ounce, and which necessarily led to the ascertainment of a more correct total tare, the difference being entirely in favour of the revenue; but the chief value consisted in he abandonment of the calculation by fractions of ounces, the operation being thenceforward onfined to the simple rules of multiplication and division.

Example.

		Parts.		
12 boxes, each containing 24 rolls	1 box - -	75		
	3 rolls = 17 × 8 =	136		
			211 =	2,532
8 boxes, each containing 18 rolls	1 box - -	54		
	3 rolls = 14 × 6 =	84		
			138 =	1,104
2 boxes, each containing 15 rolls	1 box - -	73		
	3 rolls = 10 × 5 =	50		
			123 =	246
				3,882
			38 lbs.	13 oz.

The following scale having been adopted in respect of the decimal remainder—4 parts = 1 oz., 10 = 2 oz., 16 = 3 oz., 22 = 4 oz., 29 = 5 oz., 35 = 6 oz., 41 = 7 oz., 47 = 8 oz., 54 = 9 oz., 60 = 10 oz., 66 = 11 oz., 72 = 12 oz, 79 = 13 oz., 85 = 14 oz., 91 = 15 oz., 97 = 1 lb.

Although the change from the ounce to the Decimal System, as here attempted to be shown, appears sufficiently easy, yet it is not to be inferred that it did not encounter the difficulties in its introduction which most new projects are required to undergo. It is sufficient, however, to state that the Board, perceiving its advantages, overruled all those difficulties and directed its adoption; and that they were right in that decision is sufficiently evident from the ready acceptance it has met with from the branch of trade interested in the question, and from the unquestioned facility it has afforded in their continual operations with the officers of the service.

On its first introduction, the Board limited its use to the ascertainment of tare; but after it had undergone the test of lengthened experience, they directed that the ribbons themselves might be weighed, and the boxes and cylinders disregarded. Thus the net weight of the ribbons unrolled were weighed on the tare to arrive at the total net, thus dispensing with the gross and tare and arriving directly at the net weight, as shown in the following example:—

		Roll.	Rolls.	Parts.	
1	1 canton	10			
	5 ditto each	33	= 175	− 3 = 23 =	1,342
2	4 ditto	15	= 60	− 2 = 36 =	1,080
3	1 ditto	3			
	6 ditto	12	= 75	− 2 = 46 =	1,725
4	5 ditto	12	= 60	− 2 = 45 =	1,350
5	1 ditto	26			
	1 ditto	14			
	2 ditto	30	= 100	− 2 = 13 =	650
6	1 ditto	27			
	4 ditto	30	= 147	− 3 = 21 =	1,029
7	5 ditto	30	= 150	− 3 = 19 =	950
8	1 ditto	33			
	4 ditto	30	= 153	− 3 = 22 =	1,122
9	1 ditto	32			
	4 ditto	30	= 152	− 3 = 22 =	1,115
					10,363
					103 lbs. 10 oz.

No. 15.
Decimal Weights in Customs.

Since the ad valorem duty has given place to a duty by weight, the Board have allowed that article also to be tared by the decimal weights.

These weights are also constantly used to tare many minor articles in the tariff.

Should the Decimal System be recognized generally, exactly the same division as applied to the pound could be applied to the 100 lbs., and the part itself will also divide in a similar manner; and here, it may be observed, that the division of the pound decimally can with advantage be used either to the tenth or to the hundredth part, without infringing the principle; so that in weighing an article of value the latter could be used, whilst in weighing a grosser article the tenth only need be applied.

Custom House, West India Docks,
15th January 1856.

(Signed) J. Cockshott.

Extract of a Letter from the Hon. Stephen Spring Rice, one of the Commissioners of Customs, to Lord Monteagle.

Board of Customs, 26th January 1856.

The enclosed letter has been addressed by a member of the firm of Leaf and Coles, one of the principal importers of silk goods in London, to the officer who recently reported to you on decimal taring. * * * *

Yours, &c.

The Lord Monteagle. (Signed) Stephen Spring Rice.

Enclosure.

Dear Sir, 39, Old Change, 16th January 1856.

Having heard that you are preparing a report on the present method of taring by decimal parts, as compared with the standard weights formerly used, I shall be glad if you will allow me to offer an opinion on the subject. I have had experience in both ways; and as regards the old system, when we had nothing less than a quarter of an ounce. some little advantage might probably have been shown in favour of the merchant, but the time lost in calculation, and the frequent errors which occured, completely overbalanced any benefit. The decimal parts now in use, (which were, I believe, introduced by yourself about the year 1842,) by the simplicity of operation, the readiness with which it is understood and practised, general correctness, and the facility given to business, with much saving of time, afford in my mind, the strongest reasons for their continuance. An objection may be made that, by the smaller division of the pound, a trifle more duty may occasionally be charged; this, however, I do not think worth comparing with the above advantages.

I remain, &c.

J. Cockshott, Esq.,
West India Docks.

(Signed) Joseph Ashwell.

No. 16.

No. 16.
Directions to School Inspectors.

Directions given to School Inspectors.

Extract from Minutes of the Education Committee of the Privy Council, for 1854-5, p. 115. (Presented to both Houses of Parliament by Command of Her Majesty.)

Decimal System for Coinage, and for Weights and Measures.

Committee of Council on Education,
Council Office, Downing Street, 31st January 1854.

Reverend Sir,

I am directed by the Lord President to bring under your notice the fact that there is a very strong feeling in the country that we should adopt a system of decimals in our coinage, and in our weights and measures.

The strongest objection urged against this change is, that it would create misapprehension and distrust in the minds of the people.

The Lord President thinks that you might, with advantage, call the attention of the principals of training schools to the importance of thoroughly imbuing the students under their charge with such a practical knowledge of decimals as will enable them to disseminate the information needed to accompany such a change.

The Lord President thinks that this may be done by personal communication in the course of your next circuit of inspection, and by introducing a few questions that bear upon the subject in the examination papers.

The word "decimals" is not confined in this context to decimal *fractions*, or to a knowledge of the decimal *point*. All that is proposed by a decimal system of money, weights, and measures, is to get rid of compound arithmetic, and to employ only one simple or common arithmetic, *which is decimal*. See articles by Professor De Morgan, in the Companion to the British Almanack, for the years 1841, 1848, 1854.

I have, &c.

Rev. H. Moseley,
Her Majesty's Inspector of Training Schools.

(Signed) R. R. W. Lingen.

No. 17. Change of Currency in Ireland.

No. 17.

Change of Currency in Ireland.

Abstract of 6 Geo. IV. Cap. 79.

An Act to provide for the Assimilation of the Currency and Monies of Account throughout the United Kingdom of Great Britain and Ireland.

I. The currency of Great Britain shall be the currency of the United Kingdom; and all receipts, payments, contracts, and dealings shall be made in such currency, and shall be held to be made in such currency, unless the contrary be proved to have been the intention of the parties concerned.

II. All contracts, debts, &c. in Irish currency, made or contracted previous to commencement of this Act shall be carried into effect and satisfied by payment in British currency of 12-13ths of the amount in Irish currency.

III. All duties and public revenues, and all funds and public debts, shall be estimated in British currency, and the accounts thereof kept accordingly.

IV. Not to affect the real value in gold or silver coin of the public revenues, or of any sums mentioned in Acts of Parliament, or payable in discharge of any debt due at the passing of the Act, or to become due afterwards under any custom, law, &c. previously in force.

V. To provide for the payment of fractions of a penny British currency, resulting from the converting of Irish currency into British, no payment shall be made for 4-52d parts of a penny; $\frac{1}{4}d.$ shall be paid for 8, 12, and 16-52d parts; $\frac{1}{2}d.$ for 20, 24, 28, and 32 parts; $\frac{3}{4}d.$ for 36, 40, and 44 parts; and $1d.$ for 48 parts. Sums under $12d.$ Irish shall be paid in British copper coin, as directed by the 13th section, according to the aforesaid rates.

VI. VII. On converting Irish funds into British, all pence and fractions of a penny of the principal sum shall be paid with the dividend, at the Bank of Ireland, and repaid to the bank by the Commissioners for the Reduction of the National Debt.

VIII. Where annual sums charged on the Consolidated Fund, in Irish currency, are converted into British, the Treasury may add sufficient to prevent fractions of a penny.

IX. Contracts, &c., may be made according to currency of foreign states.

X. Liabilities, &c. arising out of matters prior to the commencement of the Act to be deemed liabilities, &c. prior to the commencement of the Act.

XI. After a day to be named by proclamation, British silver and gold coins shall be current in Ireland at the same rate of pence as in Great Britain, and not as heretofore in Ireland, viz.:—The silver sixpence at $6d.$ instead of $6\frac{1}{2}d.$; shilling at $12d.$ instead of $13d.$; half-crown at $2s.$ $6d.$ instead of $2s.$ $8\frac{1}{2}d.$; crown, $5s.$ instead of $5s.$ $5d.$; half-sovereign, $10s.$ instead of $10s.$ $10d.$; half-guinea, $10s.$ $6d.$ instead of $11s.$ $4\frac{1}{2}d.$; sovereign, $1l.$, instead of $1l.$ $1s.$ $8d.$; guinea, $1l.$ $1s.$ instead of $1l.$ $2s.$ $9d.$; double sovereign $2l.$, instead of $2l.$ $3s.$ $4d.$

XII. On like proclamation Irish copper coin shall be brought into the Bank of Ireland, and exchanged there for British copper coin, at the rate of $12d.$ British for $13d.$ Irish; and the Irish copper coin shall cease to circulate.

XIII. To provide for payment of sums under $12d.$ Irish in British currency $1\frac{1}{2}d.$ Irish, and under, shall be paid by a like sum in British copper coin. From $1\frac{3}{4}d.$ to $4\frac{3}{4}d.$ by a sum less than $\frac{1}{4}d.$ than the respective Irish amount; from $5d.$ to $8d.$ less by $\frac{1}{2}d.$; from $8d.$ to $11\frac{1}{4}d.$ less by $\frac{3}{4}d.$; from $11\frac{1}{2}d.$ to $12d.$ less by $1d.$

XIV. Bankers notes to be in British currency. Penalty $50l.$

XV. Bankers allowed stamps on old notes.

XVI. Publication of Act by order of the Treasury.

XVII. Act to commence and to take effect from and after 5th January 1826.

Extracts from Coldwell's Tables for Reducing Irish Money into British Currency.

Cork, 1825.

Use of these Tables.

In conformity with the foregoing Act these tables are arranged on a new plan, with such simplicity and accuracy, as will show at *one view* the amount of any sum of Irish money reduced into British currency, as will be seen from the following explanation:—

From $\frac{1}{4}d.$ to $1l.$

The tables commence with $\frac{1}{4}d.$, advancing progressively by pence to $1l.$ Opposite the Irish is placed the amount in British currency.

From $1l.$ to $100l.$ $19s.$ $11\frac{1}{2}d.$

The tables advance by shillings, with a pence column repeated at each view; at the top of the columns are the pounds Irish, and at the left of the pages downwards are the shillings; the pence placed at the right. Under the required sum of Irish pounds, and on a line with

No. 17. Change of Currency in Ireland.

the shillings, will be seen the amount in British, to which add from the pence column. Example, suppose 44*l.* 16*s.* 11*d.* Irish to be reduced into British:—

£	s.	d.		£	s.	d.
44	16	0	in page 31 is	41	7	1
0	0	11	in pence column is	0	0	10¼
£44	16	11	Irish is -	£41	7	11¼

From 100*l.* to 20,000*l.*

The tables advance by hundreds. Opposite the Irish is placed the amount in British; and by which, in conjunction with the former part of the tables, any sum may be found. Example, suppose 12,744*l.* 16*s.* 11*d.* Irish, to be reduced into British:—

£	s.	d.		£	s.	d.
12,700	0	0	in page 56 - -	11,723	1	6½
44	16	11	in page 31 - -	41	7	11¼
£12,744	16	11	Irish is British -	£11,764	9	5¾

IRISH MONEY reduced into British Currency.

Irish. s.	Irish. d.	British. s.	British. d.	Irish. s.	Irish. d.	British. s.	British. d.	Irish. s.	Irish. d.	British. s.	British. d.
0	0¼	0	0¼	0	4¼	0	4	0	8¼	0	7½
0	0½	0	0½	0	4½	0	4¼	0	8½	0	7¾
0	0¾	0	0¾	0	4¾	0	4½	0	8¾	0	8
0	1	0	1	0	5	0	4¾	0	9	0	8¼
0	1¼	0	1¼	0	5¼	0	5	0	9¼	0	8½
0	1½	0	1½	0	5½	0	5¼	0	9½	0	8¾
0	1¾	0	1½	0	5¾	0	5½	0	9¾	0	9
0	2	0	1¾	0	6	0	5¾	0	10	0	9¼
0	2¼	0	2	0	6¼	0	6	0	10¼	0	9½
0	2½	0	2¼	0	6½	0	6¼	0	10½	0	9¾
0	2¾	0	2½	0	6¾	0	6½	0	10¾	0	10
0	3	0	2¾	0	7	0	6¾	0	11	0	10¼
0	3¼	0	3	0	7¼	0	7	0	11¼	0	10½
0	3½	0	3¼	0	7½	0	7¼	0	11½	0	10¾
0	3¾	0	3½	0	7¾	0	7½	0	11¾	0	10¾
0	4	0	3¾	0	8	0	7½	1	0	0	11

Shillings Irish.	£1 Irish. British. £	s.	d.	£2 Irish. British. £	s.	d.	£3 Irish. British. £	s.	d.	£4 Irish. British. £	s.	d.	Pence. Irish. d.	Pence. British. d.
0	0	18	5½	1	16	11	2	15	4½	3	13	10¼	½	½
1	0	19	4½	1	17	10¼	2	16	3¾	3	14	9¼	1	1
2	1	0	3¾	1	18	9¼	2	17	2¾	3	15	8¼	1½	1½
3	1	1	2¾	1	19	8¼	2	18	1¾	3	16	7½	1¾	1¾
4	1	2	1¾	2	0	7½	2	19	1	3	17	6½	2	1¾
5	1	3	1	2	1	6½	3	0	0	3	18	5½	2½	2¼
6	1	4	0	2	2	5½	3	0	11	3	19	4½	3	2¾
7	1	4	11	2	3	4½	3	1	10¼	4	0	3¾	3½	3¼
8	1	5	10¼	2	4	3¾	3	2	9¼	4	1	2¾	4	3¾
9	1	6	9¼	2	5	2¾	3	3	8¼	4	2	1¾	4½	4¼
10	1	7	8¼	2	6	1¾	3	4	7½	4	3	1	4¾	4½
11	1	8	7½	2	7	1	3	5	6½	4	4	0	5	4¾
12	1	9	6½	2	8	0	3	6	5½	4	4	11	5½	5
13	1	10	5½	2	8	11	3	7	4½	4	5	10¼	6	5½
14	1	11	4½	2	9	10¼	3	8	3¾	4	6	9¼	6½	6
15	1	12	3¾	2	10	9¼	3	9	2¾	4	7	8¼	7	6½
16	1	13	2¾	2	11	8¼	3	10	1¾	4	8	7½	7½	7
17	1	14	1¾	2	12	7½	3	11	1	4	9	6½	8	7½
18	1	15	1	2	13	6½	3	12	0	4	10	5½	8½	7¾
19	1	16	0	2	14	5½	3	12	11	4	11	4½	9	8¼
													9½	8¾
													10	9¼
													10½	9¾
													11	10¼
													11¼	10½
													11½	10½

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Irish.	British.	Irish.	British.	Irish.	British.
£	£ s. d.	£	£ s. d.	£	£ s. d.
100	92 6 1¾	1,800	1,661 10 9¼	3,500	3,230 15 4½
200	184 12 3¾	1,900	1,753 16 11	3,600	3,323 1 6½
300	276 18 5½	2,000	1,846 3 1	3,700	3,415 7 8¼
400	369 4 7½	2,100	1,938 9 2¾	3,800	3,507 13 10¼
500	461 10 9¼	2,200	2,030 15 4½	3,900	3,600 0 0
600	553 16 11	2,300	2,123 1 6½	4,000	3,692 6 1¾
700	646 3 1	2,400	2,215 7 8¼	4,100	3,784 12 3¾
800	738 9 2¾	2,500	2,307 13 10¼	4,200	3,876 18 5¼
900	830 15 4½	2,600	2,400 0 0	4,300	3,969 4 7½
1,000	923 1 6½	2,700	2,492 6 1¾	4,400	4,061 10 9¼
1,100	1,015 7 8¼	2,800	2,584 12 3¾	4,500	4,153 16 11
1,200	1,107 13 10¼	2,900	2,676 18 5½	4,600	4,246 3 1
1,300	1,200 0 0	3,000	2,769 4 7½	4,700	4,338 9 2¾
1,400	1,292 6 1¾	3,100	2,861 10 9¼	4,800	4,430 15 4½
1,500	1,384 12 3¾	3,200	2,953 16 11	4,900	4,523 1 6½
1,600	1,476 18 5½	3,300	3,046 3 1	5,000	4,615 7 8¼
1,700	1,569 4 7½	3,400	3,138 9 2¾		

From the Irish Almanac and Directory of 1825.

TABLE of EXCHANGE at PAR, or $8\frac{1}{3}$ per Cent.

English into Irish.			English into Irish.			Irish into English.		
£	£ s. d.		£	£ s. d.		£	£ s. d.	
1,000 -	1,083 6 8		7 -	7 11 8		300 -	276 18 5½	
900 -	975 0 0		6 -	6 10 0		200 -	184 12 3¼	
800 -	866 13 4		5 -	5 8 4		100 -	92 6 1¾	
700 -	758 6 8		4 -	4 6 8		90 -	83 1 6½	
600 -	650 0 0		3 -	3 5 0		80 -	73 16 11	
500 -	541 13 4		2 -	2 3 4		70 -	64 12 3¾	
400 -	433 6 8		1 -	1 1 8		60 -	55 7 8¼	
300 -	325 0 0					50 -	46 3 1	
200 -	216 13 4					40 -	36 18 5½	
100 -	108 6 8		Irish into English.			30 -	27 13 10	
90 -	97 10 0					20 -	18 9 2¾	
80 -	86 13 4					10 -	9 4 7¼	
70 -	75 16 8					9 -	8 6 1¾	
60 -	65 0 0		£	£ s. d.		8 -	7 7 8¼	
50 -	54 3 4		1,000 -	923 1 6½		7 -	6 9 2¾	
40 -	43 6 8		900 -	830 15 4½		6 -	5 10 9¼	
30 -	32 10 0		800 -	738 9 2¾		5 -	4 12 3¾	
20 -	21 13 4		700 -	646 3 1		4 -	3 13 0	
10 -	10 16 8		600 -	553 16 11		3 -	2 15 4½	
9 -	9 15 0		500 -	461 10 9¼		2 -	1 16 11	
8 -	8 13 4		400 -	369 4 7½		1 -	0 18 5½	

LETTER from Colonel LARCOM, Under-Secretary to the Lord Lieutenant, respecting the Change of Currency in Ireland.

DEAR LORD MONTEAGLE, Phœnix Park, 9th December 1855.

I HAVE had careful search made, and the enclosed memorandum shews what we possess.

You shall have copies of any of the letters, or of the proclamation, if you desire them.

* * * * * *

I am, &c.
(Signed) M. A. LARCOM.

MEMORANDUM.

The letters in this office relative to the change of currency in 1826 are very few. There are letters from Cork, Limerick, and Kinsale, complaining of the want of copper coins, and from Coleraine, complaining of the inconvenience of the old and new coinage circulating together at different rates. The old copper coins were for some time allowed to remain in circulation, and the new were issued only in exchange for the old, at twelve of the former for thirteen of the latter. Applications were made to the Government to

No. 17. Change of Currency in Ireland.

issue the new copper coins in exchange for silver and bank notes, but these were not complied with, because it would then have been impossible to get the old coins out of circulation. From a letter from Cork it appears that although the old coins were *legally* of less value than the new, they in fact circulated as of equal value with the latter, and that, consequently, the holders of them were backward to exchange them for new coins on the disadvantageous terms on which alone the latter could be obtained from the Government. It was proposed to prohibit, after a certain day, the circulation of the old coins; but instead of this a proclamation was issued, dated 12th July 1826, reciting that great inconveniences arose from the different rates of the currency, and that it would be a considerable time before the old coins could be recoined, and declaring that the old copper money should thenceforth be current at the rate of 12*d.* = 1*s.* British.

Letter from the Right Hon. Henry Goulburn.

My dear Monteagle, Betchworth, 20th December 1855.

If you look to the Act which passed for the assimilation of the British and Irish currency (6 Geo. IV. c. 79), you will find provision made for what were the difficulties of dealing with the smaller coins.

When it was carried into effect in Ireland the Treasury did not at first furnish us with a sufficient amount of new coin to effect the exchange, and the complaints made to me in 1826 relate principally to this subject.

I enclose an extract of a letter which I wrote to the Secretary of the Treasury, which you may like to see.

I have, &c.
(Signed) Henry Goulburn.

Extract.

My dear Herries, Dublin Castle, 30th December 1825.

The want of a new copper coinage has created a difficulty in the charging and payment of postage, which I have been obliged to provide for without previous communication with you.

You no doubt recollect the difficulty which was at first felt as to converting Irish into British currency on the back of each letter, and the authority which you gave to substitute for a sum in Irish the next lowest even sum in British currency.

Orders were some time since issued accordingly, and the British currency rates of 1*d.*, 2*d.*, 3*d.*, 4*d.*, and 5*d.*, were substituted for the Irish rates now received of 2*d.*, 3*d.*, 4*d.*, 5*d.*, and 6*d.* From want of new coinage, however, it is impossible to pay those British rates. Irish halfpence must for some time be our principal, if not our only, circulation.

It is necessary, therefore, either to reduce our receipts of postage still lower by taking Irish halfpence as equivalent to British, or to continue to charge and receive our Irish rates in Irish currency.

Upon consulting our law adviser, he pronounced the latter course to be illegal, the section of the Act particularly requiring postage to be charged in British currency.

I have therefore authorized the Post Office to accept Irish halfpence as if they were British in payment of all rates under sixpence, and in payment of all pence above 6*d.* or 1*s.* respectively. This would lead to a further diminution of the revenue of this department, already reduced by the arrangement which the Treasury sanctioned, but I hope you will think it was unavoidable.

I have, &c.
(Signed) Henry Goulburn.

Letter from the Governor of the Bank of Ireland.

My Lord, Bank of Ireland, 31st December 1855.

I should have replied earlier to your letter of the 6th inst., but wished to make the fullest inquiry in my power on the point you particularly allude to before writing to your lordship.

The changes made in Ireland by the 6th Geo. 4th chapter 47, were two-fold. There was the change of currency from the old Irish rate of thirteen pence to the British shilling of twelvepence, and the change of the silver coinage from the Irish bank tokens of ten pence and five pence Irish currency to the British shilling and sixpence. The copper coin in use being made to represent the same value in British as they had previously in Irish currency, thus raising the value of these coins by one-twelfth.

From the best information I can obtain, I am led to believe that these changes were made without any serious difficulty or inconvenience.

In our establishment such preparations were made previous to the commencement of the Act, that by closing the bank for public business for three days, on the day appointed the books were opened with all the balances of the accounts in the bank both public and private, whether cash or government stock converted into British currency, and after a few days business seemed to go on without any confusion, the other bankers and respectable merchants and traders having made similar preparations for the change on the 6th January

No. 17. Change of Currency in Ireland.

1825. The bank being also well supplied with silver coin of British currency, it was rapidly given out in exchange for the bank tokens, which soon disappeared from circulation altogether.

As regards the poorer classes, the effect of the change was at first considered unfavourable, the nominal amount of wages and small payments being lower than before; but this gradually passed away, the general tendency of the period which has since intervened being to raise the wages of the artizan and labourer, who before long were paid as high in nominal amount in British currency as they had been in Irish, and of late years considerably higher.

I need scarcely add, that it will at all times afford me much pleasure to furnish any information in my power which may be of service to your lordship.

I have, &c.

To the Lord Monteagle, Exchequer, London. (Signed) Jas. R. Stewart, Junr.

Letter from the Honorary Secretary to the Dublin Chamber of Commerce.

My Lord, Chamber of Commerce, Dublin, 16th January 1856.

The council of this chamber delayed replying to your lordship's communication on the subject of the change of currency and the withdrawal of the tenpenny tokens in 1826, with a view to obtaining as extensive and accurate information as possible.

The result of this inquiry confirms the opinion expressed to your lordship when you were good enough to favour us with a visit, that the inconvenience resulting from the alterations referred to was inconsiderable and of short duration. In large commercial transactions it was scarcely felt; but persons receiving small sums in wages and expending small sums in purchases not amounting to a shilling, could not for a time be persuaded that they were not defrauded of a penny in every shilling. This impression was strengthened, if not originally created, by the fact that about twelve months before January, 1826, there was an extensive issue in Ireland of shilling and sixpenny coins, which, while the Irish currency continued, represented respectively 13*d.* and 6½*d.*, and the humbler classes seeing that in 1826 these were only "good for" 12*d.* and 6*d.*, and unable to comprehend the distinction between the two currencies, really believed they were injured by the change. To some extent, indeed, they were right, as small transactions did not readily admit of an equitable arrangement. After a short period, however, the natural tendency of trade to adjust its own operations, some small concessions on the part of employers, and more general information amongst the people, removed every objection to this most useful and important measure.

Should your lordship desire it we shall endeavour to induce witnesses to attend before your commission; but you may be assured you have here the sum of any information which they could supply.

I have, &c.

Right Hon. the Lord Monteagle. (Signed) Francis Codd, Hon. Sec.

No. 18. Isle of Man.

No. 18.

Change of Currency in Isle of Man.

Letter from W. Massey, Esq., Under Secretary of State, enclosing Letter from the Lieutenant Governor of the Isle of Man, respecting the Change of Coinage in 1840.

My dear Lord, Home Office, 22d January 1856.

The only information here relative to our alterations in the currency of the Isle of Man being a Minute of an Order in Council assimilating the currency of the island to that of Great Britain, I desired that a letter should be written to the Lieutenant Governor of Man; and I enclose his answer just received. If I can make any further inquiry, let me have your instructions.

I remain, &c.

The Lord Monteagle. (Signed) W. Massey.

Sir, Government House, Isle of Man, 19th January 1856.

With reference to your letter of the 15th instant, marked private, asking for information on the change of the currency in the Isle of Man, I beg to say that prior to 1840 there was a copper currency in this island, of which 14*d.* was equivalent to 1*s.* British, and 1*l.* 3*s.* 4*d.* to 1*l.* sterling.

No. 18. Isle of Man.

On the 17th March 1840, an Act of Tynwald was promulgated assimilating the copper currency to that of Great Britain, providing for future payments being in British money, and fixing the equivalent rates. This Act came into operation in September following under a proclamation of the Lieutenant Governor, and upon the first issue of the new coinage, and calling in of the old, there was great dissatisfaction in the island, especially among the lower classes, and serious riots took place at Douglas, Peel, and elsewhere. Considerable damage was done to property, and peace was only restored by the interference of the military.

I believe the dissatisfaction arose partly from prejudice against any interference with the old insular currency, to which the people were accustomed, and partly from the belief that they lost twopence out of a shilling by the change. And I have no doubt that to some extent the lower classes may have suffered loss at the time in making purchases to small amounts from the retail dealers, as it is probable that from many of them they may not have got such an increase of quantity per 1*d.* British as would be a fair proportion to the price under the old Manx currency. This feeling has of course long since passed away, and I am not aware of any inconvenience now, except that in all the Acts of Tynwald previous to that date, fixing penalties, regulating fees, &c., the amounts are of course expressed according to the old Manx currency, and have now to be converted into British money.

The only other change of the currency here of which I am aware is that in 1710, 1733, and 1758, Acts were passed respectively, from which it appears, that in consequence of the inconvenience arising from a deficiency of copper currency at these dates, the Lords of the Island introduced certain sums of copper money, which are made current in the island by these Acts.

If there are any other points connected with this subject on which Sir George Grey wishes for more specific information, I have no doubt I could obtain it from those who were in the island at the time of the change in 1840.

I have, &c.
(Signed) CHARLES HOPE.

No. 19.

No. 19. East Indies.

EAST INDIES.

MEMORANDUM by WM. LEACH, Esq., Assistant Secretary to the Board of Control, on the Measure adopted by the Government of India, in the year 1835, for establishing a Uniform Currency in the British Territories.

1. State of the coinage of British India, prior to the introduction of a uniform currency in 1835.

1. Previously to the change in the Indian currency in 1835, the silver coins, of which the circulation was authorized by the Government, were of four denominations:—

The *sicca rupee* in the lower provinces of Bengal;
The *Furruckabad rupee* in the upper or north-western provinces;
The *Arcot rupee* at Madras; and
The *Bombay rupee* at Bombay.

The last three were either precisely, or so nearly of the same weight and fineness, that they were exchangeable at the Government treasuries the one for the other.

The Madras and Bombay coins were of the weight of 180 grains, and containing 1-12th of alloy, yielded 165 grains of pure silver.

The Furruckabad rupee weighed 179·16 grains. Its pure silver was 164·77 grains.

The sicca rupee weighed 191·9 grains, and contained 175·9 grains of pure silver.

It had been formerly customary to consider the sicca rupee less valuable according to the length of time it had been in circulation, and its original fineness being nearly pure silver, the exposure to abrasion may, in some measure, have favoured the assumption. Hence arose other denominations of rupees in account.

The sicca rupee, after two years circulation, was called a *sonaut*, or *a coin of years*, which was considered 4½ per cent. inferior to the sicca; and the next distinction was the *current rupee*, of which 116 were considered equal to 100 siccas, being 6¼ per cent. inferior.

The *sonaut* and the *current* rupees then became coins of account, but were not represented by any definite portion of the currency.

The accounts of the Government were originally kept in *current*, and afterwards in *sicca* rupees, until the *Company's rupee* was adopted in account in 1836-37.

The military establishments were deemed to be entitled to be paid at the rate of the sonaut rupee. The civil allowances were discharged in sicca rupees; and the rents due to the Government, and the transactions of the public debt, were contracted in the latter coin.

The East India Company, with a view to check depreciations of the coin, and the impositions of the shroffs, or native money-changers, consequent upon it, determined, in 1773, soon after they began to acquire power, and the right of coining in the lower

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provinces, that all the sicca currency should bear the date of the nineteenth year of the Mogul Emperor, Shah Allum, so that the date of coinage of the respective coins might not be known; and hence the Calcutta sicca rupee bore the title of a '19 *sun sicca.*'

Other rupees were in circulation, such as the Benares rupee, fabricated by the Government at a mint that had been closed, and many descriptions of coins fabricated at native mints. They were received at the Treasury at certain established rates of value; but only the coins above enumerated were a legal tender, with their divisions, the small silver and the copper coins, which were legal tenders for a fraction of the rupee.

Gold coins were fabricated and put into circulation to a limited extent.

The *gold mohur* was exchangeable for sixteen sicca rupees, and its divisions proportionately.

The subdivision of the several legal rupees was into sixteen annas, and each of these into twelve pies.

Prior to 1835, the small coins consisted of *half* and *quarter rupees*, or eight and four anna pieces in silver.

In copper, a *pyce* was circulated of the value of three pies, and a *double pyce* of the value of six pies, or half an anna.

Cowry shells were, and are still used to represent the divisions of the pie for smaller purchases, but the quantity representing the pie varies at different periods.

2. Difficulties and inconveniences apprehended from a change of the currency.

2. The introduction of a uniform rupee was urged by the local Government from time to time upon the attention of the Government at home; but for many years the proposition was received unfavourably, under the impression that the projected change involved many serious risks, and that as the coin was uniform in value throughout the greater part of India, and interchanges of coin between the Presidencies was very unfrequent, it was not right to incur those risks for an inadequate benefit.

The inconveniences apprehended by the change were of the following character:—

1st. That the zemindars, or landholders, would not submit readily to pay a larger number of rupees than that which they had engaged to pay under their pottahs, or leases, and that a loss of 17,80,000 rupees, or 178,000*l.* a year, would be the consequence of abandoning the difference. And it was considered that no prudent Government would incur the danger of that dissatisfaction, or put in question the good faith of the British nation.

2d. That the army stationed in the lower provinces would be dissatisfied if they were paid in the new rupee instead of the sonaut, as the former would be of two per cent. less value than the latter.

3d. That the civil servants would never be satisfied to receive a rupee so much inferior to that in which their salaries were fixed, and that compensation must be made to them accordingly.

4th. That the proposed change in the currency could not but produce a change in the prices of commodities; that purchasers at the large sales of salt and opium held by the Government would not give an equivalent increase in the number of rupees for the articles they purchased, and that heavy loss would thus accrue to the Government.

The objections of the Court of Directors against the change in the currency were urged, on the latest occasion, in a despatch dated 11th March 1829, in which they signified their decided disapproval of the measure, and their desire that it should not be adopted without their previous authority.

Nothing further passed upon the subject for several years.

3. Introduction of a uniform currency.

3. In 1833 the Act of 3 & 4 William IV., cap. 85., regulating the Government of the British possessions in India for a further term of 20 years, passed, which conferred greater powers of control, and supervision of affairs generally in India, upon the Governor General in Council, and enabled them to pass laws for the administration of affairs in India, which did not require the previous sanction of Parliament.

The Act, however, gave no countenance to any departure from the distinct instructions of the Court of Directors, so that the Government of India acted quite irregularly when, in 1835, without communication with the home authorities, they determined to substitute a coin called the "*Company's Rupee*," for the various coinages then in circulation, including the sicca currency, and passed an Act (XVII. of 1835) on the 17th August 1835, declaring that from the 1st September following the only silver coins to be fabricated by the Government should be a "Company's Rupee," of the weight of 180 grains, troy, and containing 165 grains of pure silver, together with a half, and quarter, and double rupee.

The inscription was to indicate the year of the reign of the British Sovereign, and to contain the words "East India Company." The designation of the Mogul Emperor, and the year of his reign, were thenceforth discontinued.

It was further enacted that the new coin should pass as equivalent to the Bombay, Madras, Furruckabad, and sonaut rupees, and to $\frac{15}{16}$ of the Calcutta sicca rupee; and the same proportion to apply to the double rupee, and to the divisions of the rupee. Any engagements to pay in the Bombay and other rupees might be satisfied by payment in the Company's rupee, and the same to apply to the principal or interest of the public debt.

A new gold coinage was also authorized. The new mohur being of the value of fifteen rupees (instead of sixteen, as formerly), and the weight and fineness the same as the rupee. The inscription was similar to that on the silver coin. But no gold coin was to be thenceforward a legal tender in the East India Company's territories.

On the 7th of December 1835, an Act was passed regulating the copper coinage, and enacting that only the copper coins, hereafter described, should be issued from any mint in India.

A pyce weighing - - - -	100 grains troy.
A double pyce - - - -	200 ,,
A single pie, or $\frac{1}{12}$ of an anna - -	$33\frac{1}{3}$,,

The pyce to exchange for $\frac{1}{64}$ of a rupee, and the single pie for $\frac{1}{192}$, so that each pyce was equivalent to three pies.

These were only to be legal tenders for fractions of a rupee.

The copper coins were the same in division and in weight as those used with the sicca currency, but were distinguishable from these by inscription.

4. Many circumstances combined, at the period when the change was made, to render the introduction of the new coin much more easy than was at first apprehended.

4. Result of the introduction of the new currency.

A short time before the change, a revision of the salaries of the civil servants of the East India Company had been effected by Lord William Bentinck, and one part of that revision was to change the denomination of coin in which they were fixed, from sicca to sonaut rupees. They thus stood upon the same footing, in that respect, as the military branch of the service.

This obviated any claim by the civilian for a larger number of the new rupees than that at which his salary was fixed.

This likewise smoothed the way for the reception, without complaint, of the new rupee by the army, notwithstanding the inferiority of two per cent. in the value of the new coin, as compared with the sonaut rupee. The soldier also obtained a benefit which he had long desired. He received a larger number of rupees than under the rules of the sicca currency, which yielded only 95 rupees, 11 annas, for 100 sonauts; and he had supposed that his ability to purchase articles in the bazaar would be *pro tanto* increased.

With respect to persons having claims upon the Government, fixed in sicca currency, the fortunate coincidence that the two coins differed in value to the extent of one anna, or thereabouts, so that the new rupee was exchangeable for fifteen annas of the sicca currency, presented an important facility for an intelligible exchange of the two coins.

With respect to the copper currency, a large quantity of Benares or Trysolee pyce was called in, and a considerable loss was borne by the Government.

The substitution of the new for the old Calcutta copper tokens, which, by the Indian Acts authorizing their fabrication, respectively bore a different value, though of the same weight, was facilitated by the acceptance of the offer of the Trade Association of Calcutta, to open change-shops in different stations, where the coins might be easily exchanged.

A measure subsequently adopted by the Government also promoted the same object.—They licensed a number of Podars (not less than 60 or 80) in Calcutta and its environs, whose business it was to exchange the new coin for silver, they retaining half a pie out of every rupee so exchanged. In the north-western provinces a similar arrangement was made, but one pie per rupee was retained by the Podar.

This measure has been since disapproved and discontinued; but the particular operation above described was doubtless facilitated by it while it lasted.

On the 1st January 1838, the Government, considering the new currency sufficiently in circulation, declared the sicca rupee to be thenceforth receivable only as bullion at the Public Treasuries.

It should be remarked that in the correspondence of the Indian Government which followed the change of currency, while inconveniences are admitted to have been experienced, the information is very meagre as to their nature, and the way in which they were met. This might arise partly from the fact that the local Government was subjected to severe reprehension for having acted contrary to the express orders of the Court, and that the inconveniences resulting from the measure were less fully and pointedly noticed than they might otherwise have been.

How far the measure may have affected the prices of commodities, and the receipts of Government from that source, there is no opportunity of judging from the correspondence of that period.

Upon the whole, there is fair ground to conclude that this change in the Indian currency, which practically affected only the lower provinces of Bengal, was accomplished without any considerable loss, and with much less inconvenience than had been anticipated.

It may not be irrelevant to the inquiry now in progress, to mention that one step towards an important desideratum for India—a decimal coinage,—has been taken, in the fabrication of one for the use of a section of the British territories in that quarter of the world.

In the year 1847, in consequence of the great want of a legal coin to represent fractions of the Spanish dollar in the Settlements of Penang, Singapore, and Malacca, where that coin circulates largely, a coinage of cents, half cents, and quarter cents, constituting decimal divisions of the dollar, was authorized to be issued by Act VI. of the Indian Legislature of 1847, an extract of which is hereunto subjoined.

It was represented by the Government of Singapore that the coins were brought into circulation without difficulty, and were very conducive to the convenience of the inhabitants.

No. 19. East Indies.

EXTRACT of an Act of the Government of India (No. VI. of 1847), for establishing a Copper Currency in the Settlements of Penang, Singapore, and Malacca, dated 1st May 1847.

I. It is hereby enacted that from and after the date of the passing of this Act, the provisions of Acts XXI. of 1835, and XXII. of 1844, shall not be deemed to apply to copper currency of the Settlements of Penang, Singapore, and Malacca.

II. And it is hereby enacted, that from and after the 1st day of January 1848 the following copper coins only shall be received at, or issued from, any Government Treasury within the said Settlements:

1. A cent, weighing 144 grains Troy.
2. A half cent, weighing 72 grains ditto.
3. A quarter cent, weighing 36 grains ditto.

III. And it is hereby enacted, that from and after the date of the passing of this Act, the said cent shall be legal tender throughout the said Settlements for $\frac{1}{100}$ of a dollar, and the said half cent for $\frac{1}{200}$ of a dollar, and the said quarter cent for $\frac{1}{400}$ of a dollar.

IV. Provided always, and it is hereby enacted, that none of the said coins shall be legal tender except for fractions of a dollar.

V. And it is hereby enacted, that after the 1st day of January 1848, no other copper coins or tokens than those specified in Section II. of this Act shall be legal tender of payment for the fractional parts of a dollar within the said Settlements.

ACT No. XVII. OF 1835.

Passed by the Honourable the Governor General of India in Council on the 17th August 1835.

I. BE it enacted, that from the first day of September 1835, the under mentioned silver coins only shall be coined at the mints within the territories of the East India Company:—A rupee, to be denominated the Company's rupee—a half rupee—a quarter rupee—and a double rupee; and the weight of the said rupee shall be 180 grains troy, and the standard shall be as follows:

$\frac{11}{12}$, or 165 grains of pure silver,
$\frac{1}{12}$, or 15 „ of alloy;

and the other coins shall be of proportionate weight and of the same standard.

II. And be it enacted, that these coins shall bear on the obverse the head and the name of the reigning Sovereign of the United Kingdom of Great Britain and Ireland, and on the reverse the designation of the coin in English and Persian, and the words "East India Company" in English, with such embellishment as shall, from time to time, be ordered by the Governor General in Council.

III. And be it enacted, that the Company's rupee, half rupee, and double rupee, shall be a legal tender in satisfaction of all engagements, provided the coin shall not have lost more than two per cent. in weight, and provided it shall not have been clipped or filed, or have been defaced otherwise than by use.

IV. And be it enacted, that the said rupee shall be received as equivalent to the Bombay, Madras, Furruckabad, and Sonat rupees, and to fifteen sixteenths of the Calcutta Sicca rupee, and the half and double rupees respectively shall be received as equivalent to the half and double of the above-mentioned Bombay, Madras, Furruckabad and Sonat rupees, and to the half and double of fifteen sixteenths of the Calcutta Sicca rupee.

V. And be it enacted, that the Company's quarter rupee shall be a legal tender only in payment of the fraction of a rupee.

VI. Provided, that if in any contract for the payment of Calcutta Sicca rupees it shall have been specially stipulated that if payment be made in the territories of the Madras, Bombay, or Agra Presidency, it shall be made in the rupees now current in those Presidencies respectively, at a different rate from that above provided with reference to the Calcutta Sicca rupee, the contract shall be satisfied by payment within those Presidencies of Company's rupees of the amount of Furruckabad, Madras, or Bombay rupees so especially stipulated:—Provided also, that if payment of the principal or interest of the public debt be made for the convenience of creditors at any public treasury other than as stipulated in the notes and engagement of the Government, it shall be competent to the Government to make such payments at the same exchange as heretofore.

VII. And be it enacted, that the under mentioned gold coins only shall henceforth be coined at the mints within the territories of the East India Company:—

First. A gold mohur or fifteen rupee piece of the weight of 180 grains troy, and of the following standard, viz.:

$\frac{11}{12}$, or 165 grains of pure gold;
$\frac{1}{12}$, or 15 „ of alloy.

Second. A five rupee piece, equal to a third of a gold mohur.

Third. A ten rupee piece, equal to two thirds of a gold mohur.

Fourth. A thirty rupee piece or double gold mohur; and the three last-mentioned coins shall be of the same standard with the gold mohur and of proportionate weight.

VIII. And be it enacted, that these gold coins shall bear on the obverse the head and name of the reigning Sovereign of the United Kingdom of Great Britain and Ireland, and on the reverse the designation of the coin in English and Persian, and the words "East India Company" in English, with such embellishment as shall from time to time be ordered by the Governor General in Council, which shall always be different from that of the silver coinage.

IX. And be it enacted, that no gold coin shall henceforward be a legal tender of payment in any of the territories of the East India Company.

X. And be it enacted, that it shall be competent to the Governor General in Council, in his executive capacity, to direct the coining and issuing of all coins authorized by this Act; to prescribe the devices and inscriptions of the copper coins issued from the mints in the said territories, and to establish, regulate, and abolish mints, any law hitherto in force to the contrary notwithstanding.

MEMORANDUM BY JAMES COSMO MELVILL, JUN., ESQ.

There can be no question that the operation of Act XVII. of 1835 has been beneficial. During the twenty years which have elapsed a great progress has been made towards the universal acceptance in India of the Company's rupee (165 grains pure and 15 grains alloy); still much remains to be accomplished.

With respect to Central India, where for many years the new rupee failed to find any acceptance (the vicinity of other mints belonging to native powers doubtless forming a great obstacle), the Court of Directors were able, on the 13th April 1853, to write as follows to the Government of India:—

"The letter from Mr. Bushby, the Governor General's agent in Bundlecund, dated "13th May 1851, has been received by us with much satisfaction, as evidencing that "*considerable progress has been made in the last few years* towards attaining a general "uniformity in the silver currencies of Bundlecund and the Sangor and Nerbudda "territory."

The recent accessions of territory in the Punjab, Pegu, and Berar, have afforded opportunities for extending the circulation of the rupee, which have not been neglected. It is believed that the measures adopted have been very successful in the Punjab, but a complete change of currency is, of course, a work of time.

The difficulties which have been experienced have been in great measure owing to the proceedings of the native shroffs, or money changers, whose business would be limited and their profits curtailed by the establishment of one uniform silver coin. These difficulties have from time to time been noticed in correspondence with the Government of India. So lately as the 12th September last the Court addressed the following remarks to that Government with reference to the difficulty experienced in withdrawing the local currencies of Rohilcund:—

"It appears that our instructions for the receipt of the local currencies of Rohilcund "(consisting chiefly of Bareilly, Furruckabad, and Nujeejabad rupees), as bullion by "weight in exchange for Company's rupees, instead of by tale at certain rates of discount, "has been quite ineffectual towards the withdrawal of those currencies from circulation, "owing, doubtless, as observed by the Agra Board of Revenue, to the fact that the superior fineness of the old native rupees would leave the Government an advantage of two "or three per cent. on the transaction.

"It is therefore right that the rate of receipt should be altered, after the real value of "the coins in question shall have been determined upon more accurate assays. This is a "necessary preliminary step, whatever may be the ulterior proceedings.

"It being evidently conducive to the pecuniary advantages of the shroffs to maintain a "variety of currencies in circulation, we question, whatever measures be adopted, whether "they will be efficacious, so long as any profit can be reaped by the shroffs in the "exchange of Company's rupees. We believe, in short, that the withdrawal of the native "currency cannot be effected except at a pecuniary sacrifice to the Government; and with "reference to the suggestion of the Accountant of the north-west provinces, that recourse "should be had to a prohibitory and penal exactment, such a measure would, in our judgment, be unadvisable, and calculated to retard the object in view, which is more likely "to be accomplished by encouraging the people to co-operate with the Government, than "by the employment of restrictive and therefore unpopular measures."

Hopes were entertained about three years ago, that the Nizam might be induced to accept a coin of the same weight and fineness as the Company's rupee, as the currency of his dominions. His Highness had expressed a wish to be furnished from the Calcutta mint with rupees of the same size, quality, and value as the Company's rupee, but with a different inscription. The Court, in reply to the reference of the Government of India upon the subject, wrote as follows (Despatch dated 15th June 1853):—

"While we concur with the Governor General in objecting to the manufacture at the British Indian mints of any coin bearing the insignia of, or in any way recognizing the King of "Delhi as suzerain of the Nizam, we think the favourable opportunity now presented of "assimilating the Hydrabad currency in weight and fineness to the Company's rupee should "not be allowed to pass without some further proposal being made on the part of the "Governor General's agent to induce the Nizam either to accept the British Indian currency in substitution of that of his own mints, or to adopt a coinage bearing his own

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" name, without any objectionable device, and to be manufactured at the mint either of " Madras or Calcutta.

"It is scarcely necessary to enumerate the manifold evils resulting from the present " condition of the Hydrabad currency. They have frequently been practically exhibited. " An uncertain and fluctuating exchange, and the introduction of base and spurious coins, " inevitably attends the circulation in the same country of a great variety of coins, the " production of several mints. Any reform, to be effectual, must, we are convinced, be " carried out with the assistance, and by the agency of, your Government, and as we " cannot doubt that a complete reform would afford vast relief to the subjects of the " Nizam, by freeing them in their monetary transactions from the grasping exactions of " the money brokers who now rule the exchanges according to their own will, and for their " own pecuniary advantage, we consider it important to endeavour to persuade the Nizam " to conform the coinage to the British Indian standard of weight and fineness. The " present opportunity is a good one for the purpose, the initiative proposition having been " made by the desire of his Highness. If the result should be favourable to our views, it " will be necessary to pass a short Act in modification of Act No. XVII. of 1835, the " existing law not permitting the coinage at the Government mints of any silver pieces " except the Company's rupee and its fractional parts."

The anticipations of the Court have, however, not been realized. The Government of India, in a Despatch lately received, give it as their opinion that there is no prospect of the Nizam giving his consent to any real or permanent reform of the Hydrabad currency.

But measures have been adopted for giving currency to the Company's rupee in the districts recently assigned by the Nizam to the British Government, in discharge of the money debt due from his Highness. It is affirmed that there are still no less than 96 descriptions of rupees current in the Nizam's dominions.

No. 20. Emperor Napoleon.

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EXTRACT from the Memoirs dictated by Napoleon at St. Helena to Count de Montholon. Vol. 3, p. 210.

Le besoin de l'uniformité des poids et mesures a été senti dans tous les siècles ; plusieurs fois les états-généraux l'ont signalé. On attendait ce bienfait de la Révolution. La loi sur cette matière était si simple, qu'elle pouvait être rédigée dans vingt-quatre heures, adoptée et pratiquée dans toute la France en moins d'un année. Il fallait rendre commune à toutes les provinces l'unité des poids et mesures de la ville de Paris. Le Gouvernment, les artistes, s'en servaient depuis plusieurs siècles ; en envoyant des étalons dans toutes les communes, contraignant l'administration et les tribunaux à n'en point admettre d'autres, le bienfait eut été opéré sans efforts, sans gêne, et sans lois coercitives. Les géomètres, les algébristes, furent consultés dans une question qui n'était que du ressort de l'administration. Ils pensèrent que l'unité des poids et mesures devaient être déduite d'un ordre naturel, afin qu'elle fût adoptée par toutes les nations. Ils crurent qu'il n'était pas suffisant de faire le bien de quarante millions d'hommes, ils voulurent y faire participer l'univers. Ils trouvèrent que le mètre était une partie aliquote du méridien ; ils en furent la démonstration, et le proclamèrent dans une assemblée composée de géomètres Français, Italiens, Espagnols, et Hollandais. Dès ce moment, on décréta une nouvelle unité de poids et mesures, qui ne cadra ni avec les réglemens de l'administration publique, ni avec les tables de dimension de tous les arts, ni avec celles d'aucune des machines existantes. Il n'y avait pas d'avantage à ce que ce système s'étendît à tout l'univers. Cela était d'ailleurs impossible ; l'esprit national des Anglais et des Allemands s'y fût opposé. Si Grégoire VII. en réformant le calendrier l'a rendu commun à toute l'Europe, c'est que cette réforme tenait à des idées religieuses, qu'elle n'a point été faite par une nation, mais par la puissance de l'église. Cependant on sacrifiait à des abstractions et à de vaines espérances le bien des générations présentes ; car pour faire adopter à une nation vieille une nouvelle unité de poids et de mesures, il faut refaire tous les réglements d'administration publique, tous les calculs des arts ; c'est un travail qui effraie la raison. La nouvelle unité des poids et mesures, quelle qu'elle soit, a une échelle ascendante et descendante qui ne cadre plus en nombres simples avec l'échelle d'unité des poids et mesures qui sert, depuis des siècles, au Government, aux savans et aux artistes. La traduction ne se peut faire de l'une à l'autre nomenclature ; parceque ce qui est exprimé par le chiffre le plus simple dans l'ancienne, se trouverait dans le nouvelle un chiffre composé. Il faudra donc augmenter ou diminuer de quelques fractions, afin que l'espèce ou le poids exprimée dans la nouvelle nomenclature, le soit en chiffres simples. Ainsi, par exemple, la ration du soldat est exprimée par vingt-quatre onces dans l'ancienne nomenclature ; c'est un nombre fort simple ; traduit dans la nouvelle, il donne sept cent trente-quatre grammes deux cent cinquante-neuf millièmes. Il est donc évident qu'il faut l'augmenter ou la diminuer pour pouvoir arriver a sept cent trente-quatre ou sept cent trente-cinq grammes. Toutes les pièces et lignes qui composent l'architecture, tous les outils et pièces qui servent l'horlogerie, à la bijouterie, à la librarie, et à tous les arts ; tous les instruments, toutes les machines, ont été pensés et calculés dans l'ancienne nomenclature, et sont exprimés par des nombres simples, que la traduction ne pourrait rendre qu'en nombres composés de cinq à six chiffres. Il faudra donc tout refaire.

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Les savans conçurent une autre idée tout-à-fait étrangère au bienfait de l'unité de poids et de mesures ; ils y adaptèrent la numération décimale, en prenant le mètre pour unité; ils supprimèrent tous les nombres complexes. Rien n'est plus contraire a l'organisation, de l'esprit, de la mémoire et de l'imagination. Une toise, un pied, un pouce, une ligne, un point, sont des portions d'étendue fixés, que l'imagination conçoit indépendamment de leurs rapports entre eux ; si donc on demande un tiers de pouce, l'esprit opère sur-le-champ ; c'est l'étendue appelée pouce qu'il divise en trois. Par le nouveau système, au contraire, ce n'est pas l'opération de diviser un pouce en trois que doit faire l'esprit ; c'est un mètre qu'il lui faut diviser en cent onze parties. L'expérience de tous les siècles avait tellement fait comprendre la difficulté de diviser un espèce ou un poids au-delà de douze, qu'a chacune de ces divisions on avait créé un nouveau nom complexe. Si on demandait un douzième de pouce, l'opération était toute faite, c'était le nombre complexe appelé ligne. La numération décimale s'appliquait à tous les nombres complexes comme unité ; et si l'on avait besoin d'un centième de point, d'un centième de ligne, on écrivait un centième ; par le nouveau système, si l'on veut exprimer un centième de ligne il faut avoir recours à son rapport avec le mètre, ce qui jette dans un calcul infini. On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux facteurs 2 et 5, et que 12 en a quatre, savoir, 2, 3, 4 et 6. Il est vrai que la numération décimale, généralisée et exclusivement adaptée au mètre comme unité, donne des facilités aux astronomes et aux calculateurs ; mais ces avantages sont loin de compenser l'inconvénient de rendre la pensée plus difficile. Le premier caractère de toute méthode doit être d'aider la conception et l'imagination, faciliter la mémoire, donner plus de puissance à la pensée. Les nombres complexes sont aussi anciens que l'homme, parcequ'ils sont dans la nature de son organisation, tout comme il est dans la nature de la numération décimale de s'adapter à chaque unité, à chaque nombre complexe, et non à une unité exclusivement.

Enfin, ils se servirent de racines Grecques, ce qui augmenta les difficultés ; ces dénominations, qui pouvaient être utiles pour les savans, n'étaient pas bonnes pour le peuple. Les poids et mesures furent une des grandes affaires du Directoire. Au lieu de laisser agir le temps, et de se contenter d'encourager le nouveau système par tous les moyens de l'exemple et de la mode, il fit des lois coercitives, qu'il fit exécuter avec rigueur. Les marchands et les citoyens se trouvèrent vexés pour des affaires en elles-mêmes indifférentes; ce qui contribua encore à dépopulariser une administration qui se plaçait hors du besoin et de la portée du peuple, brisait avec violence ses usages, ses habitudes, ses coutumes, comme l'aurait pu faire un conquérant Grec ou Tartare, qui, la verge levée, veut être obéi dans toutes ses volontés, qu'il règle sur ses préjugés et ses intérêts, abstraction faite de ceux du vaincu. Le nouveau système de poids et mesures sera un sujet d'embarras et de difficultés pour plusieurs générations ; et il est probable que la première commission savante chargée de vérifier la mesure du méridien trouvera quelques corrections à faire. C'est tourmenter le peuple pour des vétilles.

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Extracts from a Report upon Weights and Measures. By John Quincy Adams, Secretary of State of the United States. Presented to the Senate, Feb. 22, 1821. 8vo. Washington, 1821, p. 53.

In France the principle of decimal arithmetic was applied exclusively to all weights and measures ; their multiples were all tenfold, and their subdivisions were all tenth parts.

To complete the system a vocabulary of new denominations was annexed to every weight and measure belonging to it. As a circumstance of great importance to the final success of the system, it may be remarked that these two incidents, the exclusive adoption of decimal divisions and the new nomenclature, have proved the greatest obstacles to the general introduction of the new weights and measures among the people.

It has indeed from its origin, like all great undertakings, been obliged to contend with the intemperate zeal and precipitation of its friends, not less than with prejudice, ignorance, and jealousy of every description. The admeasurement of the meridian was commenced at the very moment of the fanatical paroxysm of the French revolution. At every station of their progress in the field survey the commissioners were arrested by the suspicions and alarms of the people, who took them for spies or engineers of the invading enemies of France.

The Government was soon overthrown, the Academy of Sciences abolished, and the National Assembly of the first constitutional monarchy, just at the eve of their dissolution, instead of waiting calmly for the completion of the great work which was to lay the foundation of a system to be as lasting as the globe, in a fit of impatience passed, on the 1st of August 1793, a law, declaring that the system should go immediately into operation, and assuming for the length of the standard metre the ten millionth part of the quadrant of the meridian, according to the result of the old measurement of a degree in 1740, and arranging an entire system of weights and measures, in decimal divisions, with new denominations, all of which were to be merely temporary, and to cease when the definitive length of the metre should be ascertained. This extraordinary act was probably intended, as it directly tended, to prevent the further prosecution of the original plan ; and though

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soon after, it was followed by a decree, of 11th September 1793, authorizing the temporary continuance of the general committee of weights and measures, which had been appointed by the Academy, yet, on the 23d December of the same year, a decree of Robespierre's Committee of Public Safety dismissed from the commission Borda, Lavoisier, Laplace, Coulomb, Brisson, and Delambre, on the pretence that they were not republicans sufficiently pure. Mechain escaped the same proscription only because he was detained as a prisoner in Spain.

Yet even Robespierre and his committee were ambitious, not only of establishing the system of new weights and measures in France, but of offering them to the adoption of other nations. By a decree of that committee, of 11th December 1793, the Board or Commission of Weights and Measures were directed to send to the United States of America a metre in copper and a weight, being copies of the standards then just adopted. They were accordingly transmitted; and on the 2d of August 1794, the two standards were, by the then French minister plenipotentiary Fauchet, sent to the Secretary of State, with a letter recommending, with some urgency, the adoption of the system by the United States. This letter was communicated to Congress by a message from the President of the United States, of the 8th of January 1795.

In the meantime the mensuration of the arc of the meridian was entirely suspended, by the dismissal of Delambre and the detention of Mechain. Its progress was renewed by a decree of the National Convention of 7th April 1795, which abolished almost entirely the nomenclature of the temporary standards adopted in August 1793, and substituted a new one, being that still recognized by the law, and the units of which have been already mentioned—the metre, the gramme, the are, the litre, and the stère. To express the multiples of these units, the Greek words denominating ten, a hundred, a thousand, and ten thousand, were prefixed as additional syllables; while their tenth, hundredth, and thousandth parts were denoted by similar prefixed syllables from the Latin language. Thus, the myria-metre is ten thousand, and the kilo-metre one thousand, the hecto-metre one hundred, and the deca-metre ten metres; each of those prefixed syllables being the Greek word expressive of those respective numbers; while the deci-metre, the centi-metre, and the milli-metre are tenth, hundredth, and thousandth parts, signified by the Latin syllables respectively prefixed to them. The theory of this nomenclature is perfectly simple and beautiful. Twelve new words, five of which denote the things and seven the numbers, include the whole system of metrology; give distinct and significant names to every weight, measure, multiple, and subdivision, of the whole system; discard the worst of all the sources of error and confusion in weights and measures, the application of the same name to different things; and keep constantly present to the mind the principle of decimal arithmetic, which combines all the weights and measures, the proportion of each weight or measure with all its multiples and divisions, and the chain of uniformity which connects together the profoundest researches of science with the most accomplished labours of art, and the daily occupations and wants of domestic life in all classes and conditions of society. Yet this is the part of the system which has encountered the most insuperable obstacles in France. The French nation have refused to learn or to repeat those twelve words. They have been willing to take a total and radical change of things; but they insist upon calling them by old names. They take the metre; but they must call one-third part of it a foot. The accept the kilogramme; but, instead of pronouncing its name, they choose to call one half of it a pound. Not that the third of a metre is a foot, or the half of a kilogramme is a pound; but because they are not very different from them, and because, in expressions of popular origin, distinctness of idea in the use of language is more closely connected with habitual usage than with precision of expression.

This observation may be illustrated by our own experience, in a change effected by ourselves in the denominations of our coins, a revolution by all experience known to be infinitely more easy to accomplish than that of weights and measures. At the close of our War of Independence, we found ourselves with four English words—pound, shilling, penny, and farthing, to signify all our moneys of account. But though English words they were not English things. They were nowhere sterling, and scarcely in any two states of the Union were they representatives of the same sums. It was a Babel of confusion by the use of four words. In our new system of coinage we set them aside. We took the Spanish piece of eight, which had always been the coin most current amongst us, and to which we had given a name of our own—a dollar. Introducing the principle of decimal divisions, we said, a tenth part of our dollar shall be called a *dime*, a hundredth part a *cent*, and a thousandth part a *mille*. Like the French, we took all these new denominations from the Latin language; but instead of prefixing them as syllables to the generic term dollar, we reduced them to monosyllables, and made each of them significant by itself, without reference to the unit of which they were fractional parts. The French themselves, in the application of their system to their coins, have followed our example; and assuming the franc for their unit, call its tenth part a *decime* and its hundredth part a *centime*. It is now nearly thirty years since our new moneys of accounts, our coins, and our mint, have been established. The dollar, under its new stamp, has preserved its name and circulation. The cent has become tolerably familiarised to the tongue, wherever it has been made by circulation familiar to the hand. But the dime having been seldom, and the mille never, presented in their material images to the people, have remained so utterly unknown, that now, when the recent coinage of dimes is alluded to in our public journals, if their name is mentioned it is always with an explanatory definition to inform the reader that they are ten

cent pieces; and some of them which have found their way over the mountains by the generous hospitality of the country have been received for more than they were worth, and have passed for an eighth, instead of a tenth, part of a dollar. Even now, at the end of thirty years, ask a tradesman or shopkeeper in any of our cities what is a dime or a mille, and the chances are four in five that he will not understand your question. But go to New York and offer in payment the Spanish coin, the unit of the Spanish piece of eight, and the shop or market man will take it for a *shilling*. Carry it to Boston or Richmond, and you shall be told it is not a shilling but ninepence. Bring it to Philadelphia, Baltimore, or the city of Washington, and you shall find it recognised for an elevenpenny bit; and if you ask how that can be, you shall learn that, the dollar being of ninety pence, the eighth part of it is nearer to eleven than to any other number; and pursuing still further the arithmetic of popular denominations, you will find that half eleven is five, or at least that half the elevenpenny bit is the fivepenny bit, which fivepenny bit at Richmond shrinks to fourpence halfpenny, and at New York swells to sixpence. And thus we have English denominations most absurdly and diversely applied to Spanish coins, while our own lawfully established dime and mille remain, to the great mass of the people, among the hidden mysteries of political economy—state secrets.

Human nature, in its broadest features, is everywhere the same. This result of our own experience, upon a small scale, and upon a single object, will easily account for the repugnance of the French people to adopt the new nomenclature of their weights and measures. It is not the length of the words that constitutes the objection against them, nor the difficulty of pronunciation; for fivepenny bit is as hard to speak and as long a word as kilogramme, and elevenpenny bit has certainly more letters and syllables, and less euphony, than myriametre. But it is because in the ordinary operations of the mind distinctness dea is, by the laws of nature, linked with the chain of association between sensible images and their habitual denominations, more closely than with the exactness of logical analysis.

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The law of the 1st of August, 1793, established all the principles of the new system, but under denominations different from those which had ever been used before, and not less different from those which have been adopted since. It directed the Academy of Sciences to compose an elementary book, containing a clear explanation of the new weights and measures, with tables of equalization and instructions for adapting them to those which had been in use until then. A few days afterwards the Academy was itself abolished; but the duty of composing the book was assigned to a temporary commission, or board of weights and measures, consisting of the same persons who had been employed as members of the academy on the work. The book was composed and published in the year 1794; but on the 19th of January of that year, (30 Nivose 2,) the nomenclature had already been changed, and on the 7th of April 1795, (18 Germinal 3,) a nomenclature entirely new, with the exception of three or four words, was enacted. The names ordained by this law of 7th April 1795, are still the proper technical appellations, and have already been mentioned with their Greek and Latin prefixes of decimal multiples and subdivisions. The same law directed that weights and measures might be made of double or of half the units and their tenth part or tenth-fold amounts; but that no other subdivision or multiple, such as thirds, or quarters, or sixth, or eighth parts, should be allowed. The law of 19 Frimaire 8, (10th December 1799), declared the platina metre of 443,296 lines in the kilogramme of 18,827·15 grains mark weight, to be the definitive standard weight and measure; on the 13th Brumaire 9, (4th November 1800), the executive directory issued an arrêté, or order, authorizing, either in public writings or in habitual usage, what they called a translation into French words of the authentic nomenclature; so that the myriametre might be called a league, the kilometre a mile, the litre a pint, the kilogramme a pound, the hectogramme an ounce, the gramme a denier, and so of all the rest, excepting the *metre*, which was to have no synonymous or translated name, and the *stere*, for firewood and measures of solidity. This ordinance was never executed, and the minister of the interior, by an order of 30 Frimaire 14, (21 December 1805,) directed all the subordinate administrations to use exclusively the denominations prescribed by the law of 7th April, 1795.

An imperial decree of 12th February 1812, presents the subject under a new aspect, by ordaining,—

1. That the *units* of weights and measures should remain unchanged, as established by the law of 10th December 1799.
2. That the minister of the interior should cause to be made *instruments* for weight and mensuration, presenting the fractions or multiples of the said units the most commonly used in commerce, and accommodated to the wants of the people.
3. That these instruments should bear on their respective faces the comparison of the divisions and denominations established by law with those which had been formerly used.
4. That after a term of ten years, a report should be presented to the Emperor of the result of experience upon the improvements of which the system of weights and measures might be susceptible.
5. That in the meantime the legal system should continue to be taught in all the schools and be exclusively used in all the public offices, and in all markets, halls, and commercial transactions.

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For the execution and explanation of this decree an ordinance was on the 28th of March 1812, issued by the Minister of the Interior, of the following purport:—

Art. 1: Permission was granted to employ for the purpose of commerce,

1. A long measure equal to two metres, to be called a toise, and to be divided into six feet.
2. A measure equal to one-third of the metre, to be called a foot, to be divided into twelve thumbs, and the thumb into twelve lines.

Each of these measures shall bear on one side the corresponding divisions of the metre, that is to say, the toise, two metres, divided into decimetres, and the first decimetre into millimetres, and the foot, three decimetres and one third, divided into centimetres and millimetres, in all $333\frac{1}{3}$ millimetres.

Art. 2. All cloths may be measured by a stick equal in length to twelve decimetres, to be called an *ell* (aune), which shall be divided into halves, quarters, eighths, and sixteenths, as well as into thirds, sixths, and twelfths. It shall bear on one of its sides the corresponding divisions of the metre, in centimetres only; that is to say, 120 centimetres, numbered from ten to ten.

Art. 4. Corn and other dry measure articles may be measured, in *sales at retail*, by a vessel equal to one-eighth of the hectolitre, which shall be called a boisseau, and shall have its double, its half, and its quarter.

Art. 5. For *retail* sales of corn, seeds, meal, and roots, green or dry, the litre may be divided into halves, quarters, and eighths.

Art. 7. For *retail* sales of wine, brandy, and other liquors, measures of one quarter, one-eighth, and one-sixteenth of the litre may be used, each of which measures shall be called by a name signifying its proportion to the litre.

Art. 8. For retail sales of all the articles which are sold by weight, the shopmen may employ the following *usual* weights:—

The pound (livre), equal to half a kilogramme or 500 grammes, which shall be divided into sixteen ounces.

The ounce (once), or sixteenth part of a pound, which shall be divided into eight gros.

The gros or eighth part of the ounce, which shall be divided into halves, quarters, and eighths.

They shall bear, with their appropriate names, the indication of their weight in grammes, namely:—

The pound	500 grammes.
Half pound	250 „
Quarteron	125 „
Eighth, or half quarter	62·5 „
Ounce	31·3 „
Half ounce	15·6 „
Quarter ounce, two gros	7·8 „
Gros	3·9 „

And such is at this day the system of weights and measures, or, rather, such are the systems existing in France in their present condition; for it cannot escape observation, that this decree and explanatory ordinance engraft upon the legal system an entirely new system, founded upon different, and in many important respects opposite, principles; so that the result, hitherto, of the most stupendous and systematic effort ever made by a nation to introduce uniformity in their weights and measures, has been a conflict between four distinct systems:

1. That which existed before the Revolution.
2. The temporary system introduced by the law of 1st August 1793.
3. The definitive system established by the law of 10th December 1799; and,
4. The usual system, permitted by the decree of 12th February 1812.

This last decree is a compromise between philosophical theory and inveterate popular habits. Retaining the principle of decimal multiplication and division for the legal system, it abandons them entirely in the weights and measures, which it allows the people to use. Instead of the metre and its decimals, it gives the people a toise of six feet, an aune of three feet and one fifth, a foot of twelve thumbs, and a thumb of twelve lines. And these measures, instead of divisions exclusively decimal, are divisible in halves, thirds, quarters, sixths, eighths, twelfths, and sixteenths. Instead of a decimated kilogramme, it gives them a pound of sixteen ounces, an ounce of eight gros, and a gros of seventy-two grains. The standards of capacity, wet and dry, have the same indulgence.

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It appears also not to have been considered that decimal arithmetic, although affording great facilities for the computation of numbers, is not equally well suited for the divisions of material substances. A glance of the eye is sufficient to divide material substances into successive halves, fourths, eighths, and sixteenths. A slight attention will give thirds, sixths, and twelfths. But divisions of fifth and tenth parts are among the most difficult that can be performed without the aid of calculation. Among all its conveniences, the decimal division has the great disadvantage of being itself divisible only by the numbers two and five. The duodecimal division, divisible by two, three, four, and six, would offer so many advantages over it, that while the French theory was in contemplation, the question

was discussed, whether the reformation of weights and measures should not be extended to the system of arithmetic itself, and whether the number twelve should not be substituted for ten, as the term of the periodic return of the unit. Since the establishment of the French system, this idea has been reproduced by philosophical critics as an objection against it; and Delambre, in the third volume of the Base du Système Metrique, page 302, has considered it, and assigned the reasons for which it had been rejected. He admits, to the full extent, the advantages of a duodecimal over a decimal arithmetic, but alleges the difficulty of effecting the reformation, as the decisive reason against attempting it.

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In the French system decimal divisions were prescribed by law exclusively. The binary division was allowed as being compatible with it, but all others were rigorously excluded; no thirds, no fourths, no sixths, no eighths, or twelfths. But this part of the system has been abandoned, and the people are now allowed all the ancient varieties of multiplication and division, which are still further complicated by the decimal proportions of the law.

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The advantages of the French system might, however, be with ease adapted to that of France, but for the exclusive application in the latter of the decimal arithmetic to all its multiples and subdivisions. The decimal numbers applied to the French weights and measures, form one of its highest theoretic excellences. It has, however, been proved, by the most decisive experience in France, that they are not adequate to the wants of man in society; and for all the purposes of retail trade they have been formally abandoned. The convenience of decimal arithmetic is in its nature merely a convenience of calculation; it belongs essentially to the keeping of accounts, but is merely an incident to the transactions of trade. It is applied, therefore, with unquestionable advantage to moneys of account, as we have done; yet, even in our application of it to the *coins* we have not only found it inadequate but, in some respects, inconvenient. The divisions of the Spanish dollar as a coin are not only into tenths, but into halves, quarters, fifths, eighths, sixteenths, and twentieths. We have the halves, quarters, and twentieths, and might have the fifths; but the eighth makes a fraction of the cent, and the sixteenth even a fraction of a mil. These eighths and sixteenths form a very considerable proportion of our metallic currency; and although the eighth, dividing the cent only into halves, adapts itself without inconvenience to the system, the fraction of the sixteenth is not so tractable, and in its circulation as small change it passes for six cents, though its value is six and a quarter, and there is a loss by its circulation of four per cent. between the buyer and the seller. For all the transactions of retail trade the eighth and sixteenth of a dollar are among the most useful and convenient of our coins; and although we have never coined them ourselves, we should have felt the want of them, if they had not been supplied to us from the coinage of Spain.

This illustration from our own experience of the modifications with which decimal arithmetic is adaptable even to money, its most intimate and congenial natural relative, will disclose to our view the causes which limit the exclusive application of decimal arithmetic to *numbers*, and admit only a partial and qualified application of them to weight or measure.

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In the promiscuous use of the old weights and measures and the new, which was unavoidable in the transition from the one to the other, the approximation to each other of the quarter and the fifth parts of the unit became a frequent source of the most pernicious frauds —frauds upon the scanty pittance of the poor. The small dealers in groceries and liquors, and marketmen, gave the people the fifth of a kilogramme for a half pound, and the fifth of the litre for a half setier. The most easy and natural divisions of liquids are in continual halvings, and the Paris pint was thus divided into halves, quarters, eighths, sixteenths, and thirty-second parts, by the names of chopines, half setiers, possons, half possons, and roquilles; the half setier, just equivalent to our half pint, was the measure in most common use for supplying the daily necessities of the poor; and thus the decimal divisions of the law became snares to the honesty of the seller, and cheats upon the wants of the buyer.

Thus, then, it has been proved by the test of experience that the principle of decimal divisions can be applied only with many qualifications to any general system of metrology; that its natural application is only to numbers, and that time, space, gravity, and extension inflexibly reject its sway. The new metrology of France, after trying it in its most universal theoretical application, has been compelled to renounce it for all the measures of astronomy, geography, navigation, time, the circle, and the sphere; to modify it even for superficial and cubical linear measure, and to compound with vulgar fractions, in the most ordinary and daily uses of all its weights and all its measures. It has restored the foot, the pound, and the pint, with all their old subdivisions, though not exactly with their old dimensions. The foot, with its duodecimal divisions into thumbs and lines, returns in the form the most irreconcileable possible with the decimals of the metre; for it comes in the proportion of three to ten, and consists of $333\frac{1}{3}$ millimetres. This indulgence to linear measure is

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without qualification, and may be used in all commerce, whether of wholesale or retail. The restoration of the pound, the boisseau and the pint is limited to retail trade. The fractions of the pound are as averse to decimal combination as those of the foot. The eighth of a pound, for instance, is 62/5 decigrammes, each of about $1\frac{1}{2}$ grain troy weight. The half of this eighth is an *ounce*, to form which decimally requires a recourse to another fractional stage, and to say 31·25 milligrammes. But the milligramme being equivalent to less than $\frac{1}{6}$ of a grain troy weight, is too minute for accurate application, so that it is called and marked upon the weight itself as 31·3 decigrammes; the half ounce instead of 15·625 decimilligrammes, is marked for 15·6 decigrammes; the quarter of an ounce, instead of 7·8125, passes for 7·8 decigrammes, and the gros or groat, instead of 3·90625 is abridged to 3·9. The ounce and all the smaller weights, therefore, reject the coalition of subdivision by decimal and vulgar fractions, and the weights for account are different from the weights for trade.

From the verdict of experience, therefore, it is doubtful whether the advantage to be obtained by any attempt to apply decimal arithmetic to weights and measures, would ever compensate for the increase of diversity which is the unavoidable consequence of change. Decimal arithmetic is a contrivance of man for computing numbers, and not a property of time, space, or matter. Nature has no partialities for the number ten; and the attempt to shackle her freedom with them will ever prove abortive.

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After an experience of several years it was found necessary, not only to give back to the people the vulgar fractions of their measures, which had been taken from them, but all their indefinite and many-meaning words of pound and ounce, foot, aune and thumb, boisseau, and pint. Since which time there have been, besides all the relics of the old metrology, two concurrent systems of weights and measures in France; one, the proper legal system, with decimal divisions and multiplications, and the new, precise, and significant nomenclature; and the other a system of sufferance with the same instruments, but divided in all the old varieties of vulgar fractions, and with the old improper vocabulary made still more so by its adaptation to new and different things.

Perhaps it may be found by more protracted and multiplied experience that this is the only uniformity attainable by a system of weights and measures for universal use; that the same material instruments shall be divisible decimally for calculations and accounts, but in any other matter suited to convenience in the shops and markets; that their appropriate legal denominations shall be used for computation, and the trivial names for actual weight or mensuration.

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The experience of France has proved that binary, ternary, duodecimal, and sexagesimal divisions are as necessary to the practical use of weights and measures as the decimal divisions are convenient for calculations resulting from them, and that no plan for introducing the latter can dispense with the continued use of the former.

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"NOTES on the ESTABLISHMENT of a MONEY UNIT, and of a COINAGE for the UNITED STATES, by THOMAS JEFFERSON." Prepared in the Year 1784, and which laid the Foundation of the System adopted by Congress for a Coinage and Money of Account. —Randolph's *Mem. and Corresp. of Thomas Jefferson*, Vol. 1, p. 134.

IN fixing the unit of money, these circumstances are of principal importance—

I. That it be of *convenient size* to be applied as a measure to the money transactions of life.

II. That its parts and multiples be in *an easy proportion* to each other, so as to facilitate the money arithmetic.

III. That the unit and its parts or divisions be *so nearly of the value of some of the known coins* as that they may be of easy adoption for the people.

The Spanish dollar seems to fulfil all these conditions.

I. Taking into our view all money transactions, great and small, I question if a common measure of more *convenient size* than the dollar could be proposed. The value of 100, 1,000, 10,000 dollars is well estimated by the mind; so is that of the tenth or hundredth of a dollar. Few transactions are above or below these limits. The expediency of attending to the size of the money unit will be evident to every one who will consider how inconvenient it would be to a manufacturer or merchant if instead of the yard for measuring cloth, either the inch or the mile had been made the unit of measure.

II. The most *easy ratio* of multiplication and division is that by ten. Every one knows the facility of decimal arithmetic. Every one remembers, that when learning money arithmetic, he used to be puzzled with adding the farthings, taking out the fours, and carrying them on; adding the pence, taking out the twelves, and carrying them on; adding the shillings, taking out the twenties, and carrying them on; but when he came to the pounds, where he had only tens to carry forward, it was easy and free from error. The bulk of mankind are schoolboys through life. These little perplexities are always great to them; and even

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mathematical heads feel the relief of an easier, substituted for a more difficult process. Foreigners, too, who trade or travel among us will find a great facility in understanding our coins and accounts from this ratio of subdivision. Those who have had occasion to convert the livres, sols, and deniers of the French, the gilder, stivers, and frenings of the Dutch, the pounds, shillings, pence, and farthings of these several states—into each other can judge how much they would be aided, had their several subdivisions been in a decimal ratio. Certainly, in all cases, where we are free to choose between easy and difficult modes of operation, it is most rational to choose the most easy. The Financier, therefore, in his report well proposes that our coins should be in decimal proportions to one another. If we adopt the dollar for our unit, we should strike four coins; one of gold, two of silver, and one of copper, viz.:

1. A golden piece equal in value to ten dollars.
2. The unit or dollar itself, of silver.
3. The tenth of a dollar, of silver also.
4. The hundredth of a dollar, of copper.

Compare the arithmetical operation of the same sum of money expressed in this form and expressed in the pound sterling and its divisions:—

	£	s.	d.		Dollars.
Addition:	8	13	11½	=	38·65
	4	12	8¾	=	20·61
	13	6	8¼	=	59·26

	£	s.	d.		Dollars.
Subtraction:	8	13	11½	=	38·65
	4	12	8¾	=	20·61
	4	1	2¾	=	18·04

Multiplication by 8:

£	s.	d.		Dollars.
8	13	11½	=	38·65
20				8
173				309·20
12				
2087				
4				
8350				
8				
4)66800				
12)16700				
20)1391—8				
£69	11	8		

Division by 8:

£	s.	d.		Dollars.
8	13	11½	=	8)38·65
				4·83
20				
173				
12				
2087				
4				
8)8350				
4)1043				
12)260—¾				
20)21—8				
£1	1	8¾		

A bare inspection of the above operations, will evince the labour which is occasioned by subdividing the unit into 20ths, 240ths, and 960ths, as the English do—and as we have done—and the ease of subdivision in a decimal ratio. The same difference arises in making payments. An Englishman, to pay 8*l.* 13*s.* 11½*d.* must find by calculation what combination of the coins of his country will pay this sum; but an American having the same sum to pay—thus expressed, $38·65—will know by inspection only that three gold pieces, eight units or dollars, six tenths, and five coppers will pay it precisely.

III. The third condition required is that the unit, its multiples and subdivisions, coincide in value with some of the known coins so nearly that the people may by a quick reference to the mind estimate their value. If this be not attended to, they will be very long in adopting the innovation, if ever they adopt it. Let us examine in this point of view each of the four coins proposed.

1. The golden piece will be $\frac{1}{5}$ more than a half joe, and $\frac{1}{15}$ more than a double guinea; it will be readily estimated, then, by reference to either of them; but more readily and accurately as equal to ten dollars.

2. The unit or dollar is a known coin, and the most familiar of all to the mind of the people. It is already adopted from south to north; has identified our currency, and therefore happily offers itself as a unit already introduced; our public debt, our requisitions, and their apportionment have given it actual and long possession of the place of unit. The course of our commerce will bring us more of this than any other foreign coin; therefore it renders it more worthy of attention. I know of no unit which can be proposed in competition with the dollar but the pound. But what is the pound? 1,547 grains of fine silver in Georgia; 1,289 grains in Virginia, Connecticut, Rhode Island, Massachusetts and New Hampshire; 1,031¼ grains in Maryland, Delaware, Pennsylvania, and New Jersey; 966¾ grains in North Carolina and New York. Which of these shall we adopt? To which State give that pre-eminence of which all are so jealous, and on which impose the difficulties of a new estimate of their corn, their cattle, and other commodities? Or shall we hang the pound sterling as a common judge about all their necks? This will contain 1,718¾ grains of pure silver. It is difficult to familiarise a new coin to the people; it is more difficult to familiarise them to a new coin with an old name. Happily the dollar is

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familiar to them all, and is already as much referred to for a measure of value as their respective provincial pounds.

3. The *tenth* will be precisely the Spanish bit or half-pistereeen; this is a coin perfectly familiar to us all. When we shall make a new coin, then, equal in value to this, it will be of ready estimate with the people.

4. The hundredth or copper will differ little from the copper of the four Eastern States, which is $\frac{1}{1\,0\,8}$ of a dollar, still less from the penny of New York and North Carolina, which is $\frac{1}{9\,6}$ of a dollar, and somewhat more than the penny or copper of New Jersey, Pennsylvania, Delaware, and Maryland, which is $\frac{1}{9\,0}$ of a dollar. It will be about the medium between the old and the new copper of these States, and will therefore soon be substituted for them both. (N.B.—The half penny of Europe had become nearly the penny of the United States.) In Virginia coppers have never been in use. It will be easy, therefore, to introduce them there of one value as of another. The copper coin proposed will be nearly equal to three-fourths of their penny, which is the same with the penny lawful of the Eastern States.

A great deal of small change is useful in a State, and tends to reduce the price of small articles. Perhaps it would not be amiss to coin three more pieces of silver, one of the value of five-tenth or half dollar, one of the value of two-tenth, which would be equal to the Spanish pistereen, and of the value of five coppers, which would be equal to the Spanish half-bit; we should then have five silver coins, viz.:

1. The unit, or dollar.
2. The half dollar, of five-tenths.
3. The double tenth, equal to 2 or $\frac{1}{5}$ of a dollar or to the pistereen.
4. The tenth, equal to a Spanish bit.
5. The five-copper piece, equal to 500 or $\frac{1}{2\,0}$ of a dollar or half-bit.

The plan reported by the Financier is worthy of his sound judgment. It admits, however, of objection in the size of the unit. He proposes that this shall be the 1·440th part of a dollar; so that it will require 1,440 of his units to make the one before proposed. He was led to adopt this by a mathematical attention to our old currencies, all of which this unit will measure without leaving a fraction. But as our object is to get rid of these currencies, the advantage derived from this coincidence will soon be past, whereas the inconveniences of this unit will for ever remain, if they do not altogether prevent its introduction.

It is defective in two of the three requisites for a money unit:

1. It is incovenient in its application to the ordinary money transactions. 10,000 dollars will require eight figures to express them, to wit, 14,400,000 units. A horse or a bullock of eighty dollars' value will require a notation of six figures, to wit, 115,200 units. As a money of account this will be laborious even when facilitated by the aid of decimal arithmetic. As a common measure of the value of property it will be too minute to be comprehended by the people. The French are subjected to very labourious calculations, the livre being their ordinary money of account, and this but between $\frac{1}{5}$ and $\frac{1}{6}$ of a dollar; but what will be our labour should our money of account be $\frac{1}{1\,4\,4\,0}$ of a dollar only

2. It is neither equal nor near to any of the known coins in value.

If we determine that a dollar shall be our unit, we must then say with precision what a dollar is. This coin, as struck at different times, of different weight and fineness, is of different values. Sir Isaac Newton's assay and representation to the Lords of the Treasury in 1717 of those which he examined make their values as follows:—

	dwt.	grs.			
The Seville piece-of-eight -	17	12	containing	387 grains pure silver.	
The Mexican piece-of-eight -	17	$10\frac{5}{9}$	„	$385\frac{1}{2}$	„
The Pillar piece-of-eight -	17	9	„	$385\frac{3}{4}$	„
The New Seville piece-of-eight	14	0		$308\frac{7}{1\,0}$	„

The Financier states the old dollar as containing 376 grains of fine silver, and the new 365 grains. If the dollars circulated among us be of every date equally we should examine the quantity of pure metal in each, and from them form an average for our unit. This is a work proper to be committed to mathematicians as well as merchants, and which should be decided on actual and accurate experiment.

The quantum of alloy is also to be decided. Some is necessary, to prevent the coin from wearing too fast; too much would fill our pocket with copper instead of silver. The silver coins assayed by Sir Isaac Newton varied from $1\frac{1}{2}$ to 76 pennyweight alloy in the pound troy of mixed metal. The British standard has 18 dwt.; the Spanish coins assayed by Sir Isaac Newton have from 18 to $19\frac{1}{2}$ dwt.; the new French crown has in fact $19\frac{1}{2}$, though by edict it should have 20 dwt., that is 1–12.

The taste of our countrymen will require that their furniture plate should be as good as the British standard. Taste cannot be controlled by law. Let it then give the law in a point which is indifferent to a certain degree. Let the legislatures fix the alloy of furniture plate at 18 dwt. the British standard, and Congress that of their coin at one ounce in the pound, the French standard.

This proportion has been found convenient for the alloy of gold coin, and it will simplify the system of our mint to alloy both metals in the same degree. The coin, too, being the least pure will be less easily melted into plate. The reasons are light indeed, and of course will only weigh if no heavier ones can be opposed to them.

The proportion between the values of gold and silver is a mercantile problem altogether. It would be inaccurate to fix it by the popular exchanges of a half Joe for eight dollars,

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a Louis for four French crowns, or five Louis for twenty-three dollars. The first of these would be to adopt the Spanish proportion between gold and silver; the second, the French; the third a mere popular barter, wherein convenience is consulted more than accuracy. The legal próportion in Spain is 16 for 1; in England, 15½ for 1; in France 15 for 1. The Spaniards and English are found in experience to retain an over proportion of gold coins, and to lose their silver. The French have a greater proportion of silver. The difference at market has been on the decrease. The Financier states it at present as at 14½ for one. Just principles will lead us to disregard legal proportions altogether, to inquire into the market price of gold in the several countries with which we shall principally be connected in commerce, and to take an average from them. Perhaps we might with safety lean to a proportion somewhat above par for gold, considering our neighbourhood and commerce with the sources of the coins, and the tendency which the high price of gold in Spain has to draw thither all that of their mines, leaving silver principally for our and other markets. It is not impossible that 15 for 1 may be found an eligible proportion. I state it, however, as a conjecture only.

As to the alloy for gold coin, the British is an ounce in the pound. The French, Spanish and Portuguese differ from that only from a quarter of a grain to a grain and a half. I should, therefore, prefer the British, merely because its fraction stands in a more simple form, and facilitates the calculations into which it enters. Should the unit be fixed at 365 grains of pure silver, gold at 15 for 1, and the alloy of both be one twelfth, the weights of the coins will be as follows: —

	Grains of pure Metal.		Alloy.		dwt.	gr.
The golden piece, containing	243⅓	-	22·12	will weigh	11	1·45
The unit, or dollar -	365	-	33·18	„	16	14·18
The half dollar, or five-tenths	182½	-	16·59	„	8	7·09
The fifth, or pistereen	73	-	6·63	„	3	7·63
The tenth, or bit -	36½	-	3·318	„	1	15·818
The twentieth, or half-bit	18¼	-	1·659	„		19·9

The quantity of fine silver which shall constitute the unit being settled, and the proportion of the value of gold, to that of silver, a table should be formed from the assay before suggested, classing the several foreign coins according to their fineness, declaring the worth of a pennyweight or grain in each class, and that they shall be lawful tenders at those rates if not clipped or otherwise diminished, and where diminished, offering their value for them at the mint, deducting the expense of re-conage. Here the legislatures should cooperate with Congress, in providing that no money be received or paid at their treasuries, or by any of their officers, or any bank, but on actual weight, in making it criminal in a high degree to diminish their own coins, and, in some smaller degree, to offer them in payment when diminished.

That this subject may be properly prepared, and in readiness for Congress to take up at their meeting in November, something must now be done. The present session drawing to a close, they probably would not choose to enter far into this undertaking themselves.

The Committee of the States, however, during the recess will have time to digest it thoroughly, if Congress will fix some general principles for their government. Suppose they be instructed to appoint proper persons to assay and examine with the utmost accuracy practicable the Spanish milled dollars of different dates in circulation with us.

To assay and examine in like manner the fineness of all the other coins which may be found in circulation within these States.

To report to the Committee the result of these assays, by them to be laid before Congress.

To appoint also proper persons to inquire what are the proportions between the values of fine gold and fine silver at the markets of the several countries with which we are or probably may be connected in commerce; and what would be a proper proportion here, having regard to the average of their values at those markets, and to other circumstances, and to report the same to the Committee, by them to be laid before Congress.

To prepare an ordinance for establishing the unit of money within these States; for subdividing it; and for striking coins of gold, silver, and copper, on the following principles:—

That the money unit of these States shall be equal in value to a Spanish milled dollar, containing so much fine silver as the assay before directed shall show to be contained, on an average, in dollars of the several dates in circulation with us.

That this unit shall be divided into tenths and hundredths; that there shall be a coin of silver of the value of a unit; one other of the same metal, of the value of one-tenth of a unit; one other of copper, of the value of the hundredth of a unit.

That there shall be a coin of gold of the value of ten units, according to the report before directed, and the judgment of the Committee thereon.

That the alloy of the said coins of gold and silver shall be equal in weight to one-eleventh part of the fine metal.

That there be proper devices for these coins.

That measures be proposed for preventing their diminution, and also their currency, and that of any others, when diminished.

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That the several foreign coins be described and classed in the said ordinance, the fineness of each class stated, and its value by weight estimated in units and decimal parts of units.

And that the said draught of an ordinance be reported to Congress at their next meeting, for their consideration and determination.

Supplementary Explanations.

The preceding notes having been submitted to the consideration of the Financier, he favoured me with his opinion and observations on them, which render necessary the following supplementary explanations. I observed in the preceding notes that the true proportion of value between gold and silver was a mercantile problem altogether, and that perhaps fifteen for one might be found an eligible proportion. The Financier is so good as to inform me, that would be higher than the market would justify. Confident of his better information on this subject, I recede from that idea.

He also informs me that the several coins in circulation among us have been assayed with accuracy, and the result published in a work on that subject. The assay of Sir Isaac Newton had superseded in my mind the necessity of this operation as to the older coins, which were the subject of his examination. This later work with equal reason may be considered as saving the same trouble as to the latter coins.

So far, then, I accede to the opinions of the Financier. On the other hand, he seems to concur with me in thinking his smallest fractional division too minute for a unit, and therefore proposes to transfer that denomination to his largest silver coin, containing 1,000 of the units first proposed, and worth about 4*s.* 2*d.* lawful, or 25·36 of a dollar. The only question then remaining between us is, whether the dollar or this coin be best for the unit. We both agree that *the ease of adoption with the people* is the thing to be aimed at.

1. As to the dollar, events have overtaken and superseded the question. It is no longer a doubt whether the people can adopt it with ease; they have adopted it, and will have to be turned out of that into another tract of calculation if another unit be assumed. They have now two units which they use with equal facility, viz., the pound of their respective State, and the dollar. The first of these is peculiar to each State; the second happily common to all. In each State the people have an easy rule for converting the pound of their State into dollars, or dollars into pounds; and this is enough for them without knowing how this may be done in every State of the Union. Such of them as live near enough the borders of their State to have dealings with their neighbours, learn also the rule of their neighbours; thus in Virginia and the Eastern States, where the dollar is 6*s.* or three-tenths of a pound, to turn pounds into dollars they multiply by ten and divide by three. To turn dollars into pounds, they multiply by three and divide by ten. Those in Virginia who live near to Carolina, where the dollar is 8*s.* or four-tenths of a pound, learn the operation of that State, which is a multiplication by four and division by ten, *et e converso.* Those who live near Maryland, where the dollar is 7*s.* 6*d.* or three-eighths of a pound, multiply by three and divide by eight, *et e converso.* All these operations are easy, and have been found by experience not too much for the arithmetic of the people when they have occasion to convert their old unit into dollars, or the reverse.

2. As to the unit of the Financier. In the States where the dollar is three-tenths of a pound, this unit will be 5·24. Its conversion into the pound, then, will be by a multiplication by five and a division by 24. In the States where the dollar is three-eighths of a pound, this unit will be 25·96 of a pound, and the operation must be to multiply by 25 and divide by 96, *et e converso.* Where the dollar is four-tenths of a pound, this unit will be 5·18. The simplicity of the fraction, and of course the facility of conversion and reconversion, is therefore against this unit and in favour of the dollar in every instance. The only advantage it has over the dollar is, that it will in every case express our farthing without a remainder; whereas, though the dollar and its decimals will do this in many cases, it will not in all. But even in these, by extending your notation one figure further, to wit to thousands, you approximate to perfect accuracy within less than the two-thousandth part of a dollar, an atom in money which every one would neglect. Against this single inconvenience the other advantages of the dollar are more than sufficient to preponderate, This unit will present to the people a new coin, and whether they endeavour to estimate its value by comparing it with a pound or with a dollar, the units they now possess, they will find the fraction very compound, and of course less accommodated to their comprehension and habits than the dollar. Indeed the probability is that they could never be led to compute in it generally.

The Financier supposes that $\frac{1}{100}$ of a dollar is not sufficiently small where the poor are purchasers or vendors. If it is not, make a smaller coin. But I suspect that it is small enough. Let us examine facts in countries where we are acquainted with them. In Virginia, where our towns are few, small, and of course their demand for necessaries very limited, we have never yet been able to introduce a copper coin at all. The smallest coin which anybody will receive there is the half-bit or $\frac{1}{80}$ of a dollar. In those States where the towns are larger and more populous, a more habitual barter for small wants has called for a copper coin of $\frac{1}{90}$ or $\frac{1}{96}$ or $\frac{1}{108}$ of a dollar. In England, where the towns are many and populous, and where ages of experience have matured the conveniences of intercourse, they have found that some wants may be supplied for a farthing, or $\frac{1}{208}$ of a dollar, and they have accommodated a coin to this want. This business is evidently progressive. In

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Virginia we are far behind. In some other States they are further advanced; to wit to the appreciation of $\frac{1}{96}$, $\frac{1}{96}$, $\frac{1}{108}$ of a dollar. To this most advanced State, then, I accommodate my smallest coin in the decimal arrangement, as a *money of payment* corresponding with the *money of account*. I have no doubt the time will come when a smaller coin will be called for; when that comes, let it be made. It will probably be half of the copper I propose, that is to say, 5·1000 or ·005 of a dollar, this being very nearly the farthing of England. But it will be time enough to make it when the people shall be ready to receive it.

My proposition, then, is that our notation of money shall be decimal, descending *ad libitum* of the person noting; that the unit of this notation shall be a dollar; that coins shal be accommodated to it from ten dollars to the hundredth of a dollar; and that to set this on foot the resolutions be adopted which were proposed in the notes, only substituting *an inquiry into the fineness of the coins* in lieu of *an assay of them.*

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EXTRACTED from the "ANNUAIRE DU BUREAU DES LONGITUDES," for 1856.

MONNAIES DÉCIMALES DE FRANCE (*).

Les monnaies françaises sont assujetties, sous le rapport de leurs divisions, de leur titre, de leur poids et de leur module, au système métrique décimal des poids et mésures.

Aux termes de la loi du 7 Germinal an XI (28 Mars 1803), 5 grammes d'argent, au titre de neuf dixièmes de fin, constituent le *franc*, l'unité monétaire.

Dans l'échelle décimale, on passe de l'unité aux nombres 10 et 100 qui, divisés par 2 et 5, les seuls diviseurs de 10, donnent les pièces de 50 et de 20 francs, puis de 5 et de 2 francs. Mais, en descendant, on a le dixième et le centième du franc nommés *décime* et *centime;* leur division par 2 et 5 donne 50 et 20 centimes, puis 5 et 2 centimes. La division décimale du franc comprend donc seulement les pièces de 1, 2, 5, 10, 20, 50 centimes. Viennent ensuite le franc et ses multiples décimaux de 2, 5, 10, 20, 50, et 100 francs. La pièce de 40 francs, qui n'est pas décimale, ne se fabrique plus.

Les pièces de 1, 2, 5, 10 centimes sont en bronze, loi du 19 Avril 1852; la pièce de 20 centimes, décret du 10 Avril 1852, et celle de 50 centimes, puis le franc et ses multiples, 2 francs, 5 francs, sont en argent, loi du 7 Germinal an XI. Les pièces d'or sont:

Celle de	100	francs,	décret du 12 Decembre 1854.
„	50	„	idem.
„	20	„	loi du 7 Germinal an XI.
„	10	„	décrets des 3 Mai 1848, 12 Janvier 1854, et 7 Avril 1855.
„	5	„	décrets des 12 Janvier 1854 et 7 Avril 1855.

Titre.

Les expériences faites en France, en 1792, par l'Académie des Sciences, par suite de la proposition de Clavière de frabriquer des monnaies avec des métaux dégagés d'alliage, et les travaux de Cavendish et Hatchett en Angleterre, ont montré que l'alliage au douzième est celui qui résiste le plus longtemps au frottement.

Les monnaies d'or et d'argent de France contiennent un alliage d'un dixième et neuf dixièmes de métal pur. Le titre monétaire qui s'exprime en millièmes est, en conséquence, représenté par 900 millièmes.

L'alliage au dixième a l'avantage d'être en harmonie avec notre système de numération décimale, de simplifier les calcuts d'alliage et de titre, enfin de se rapprocher beaucoup de l'alliage au douzième qui donne au métal le plus de dureté, ou le rend le plus propre à résister à l'action du *frai*, c'est-à-dire à la diminution de poids par le frottement et la circulation.

Dans la combinaison des deux métaux, *argent* et *cuivre*, le cuivre servant d'alliage, le *point d'homogénéité* est représenté par la formule atomique $Ag^3 + Cu^4$, correspondant au titre 719 millièmes de fin; ainsi qu'il résulte des travaux faits en 1849 par M. A. Levol, membre du Bureau des essais de la Commission des Monnaies, et consignés dans les *Annales de Chimie et de Physique*, 3e série, t. XXXVI. et XXXIX.

La tolérance du titre, soit en dessus, soit en dessous du titre droit de 900 millièmes, a été fixée, par le décret du 22 Mai 1849, à partir du 1er Janvier 1850, à 2 millièmes pour les espèces d'argent, comme elle l'était déjà par la loi du 7 Germinal an XI, pour les monnaies d'or.

La tolérance du poids, par chaque sorte de pièce, en or, argent et bronze, est indiquée dans le tableau au dessous.

(*) Cet article, qui avait d'abord été donné par M. Samuel Bernard, ancien élève de l'Ecole Polytechnique, et ancien chef des bureaux de la Commission des Monnaies, a été modifié et complété ensuite par M. Neuhaus, contrôleur au change près de la Monnaie de Paris, conformément aux dispositions des décrets du Gouvernement en date des 22 Mai 1849 et 22 Mars 1854, sur les tarifs des espèces et matières d'or et d'argent.

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Poids et Diamètre des Pièces de Monnaie.

Poids. Le poids des pièces de monnaie d'argent a été etabli en nombres ronds de grammes; elles peuvent donc servir de poids usuels; ainsi:

	Poids.
1 pièce d'argent de 1 franc	5 grammes.
1 pièce d'argent de 2 francs	10 grammes.
4 pièces d'argent de 5 francs ou 10 pièces d'argent de 2 francs	100 grammes.
155 pièces d'or de 20 francs ou 40 pièces d'argent de 5 francs	1 kilogramme.
Sac de mille francs, 200 pièces de 5 francs	5 kilogrammes.

La proportion entre l'or et l'argent, qui est de $15\frac{1}{2}$ à 1 dans notre système monétaire, n'a pas permis de donner aux pièces d'or un poids en nombres ronds; mais 155 pièces de 20 francs équivalent à 1 kilogramme.

Ce qu'on vient de dire suppose que les pièces de monnaie sont du poids exact qu'elles doivent avoir, ce qui a lieu ordinairement à peu de chose près; la tolérance de poids, tant en dessus qu'en dessous étant très-minime. (*Voir* le tableau au dessous.) Il suffit d'en peser un certain nombre pour être sûr qu'un même poids donnera la même quantité de pièces.

Diamètre. Les monnaies de différentes valeurs ont plus ou moins de diamètre, suivant leur poids et la nature du métal dont elles sont composées; mais on a eu soin, en général, qu'aucun de ces diamètres ne fût le même pour les monnaies d'or, d'argent et de cuivre (*), afin qu'elles ne pussent être confondues dans les piles ou les rouleaux, et qu'on pût les distinguer à la première vue ou au tact.

Les pièces de monnaie de même métal et de même valeur ont toutes, au contraire, rigoureusement le même diamètre. Ainsi, quoique fabriquées dans divers ateliers monétaires, comme elles se frappent dans des viroles d'acier exécutées sur un seul et même calibre, elles forment, étant réunies, un cylindre parfait; ce qui donne une grand facilité pour en former des piles ou rouleaux. Il suffit d'en compter une pile, pour être sûr que toutes les autres piles de même hauteur contiendront le même nombre de pièces; si toutefois elles n'ont pas trop frayé par la circulation, et si, étant mélangées, il s'en trouve autant de neuves que de vieilles.

Le diamètre ou module des pièces étant fixé en nombres entiers de millimètres, elles peuvent offrir des mesures usuelles de longueur; ainsi, par exemple:

19 pièces d'argent de 2 francs et 20 de 1 francs
ou 20 pièces d'argent de 5 francs et 11 de 2 francs } donnent 1 mètre.

Ce qu'on vient de dire est exact pour les pièces de monnaie qui ont été frappées en virole pleine et dont les lettres de la légende sur tranche sont marquées en creux. Depuis 1830, époque à laquelle on a adopté, pour les monnaies d'or et la pièce de 5 francs, la marque sur tranche en relief, au moyen de la virole brisée, les diamètres des surfaces sont bien restés les mêmes; mais la légère saillie des lettres de la tranche donnerait moins d'exactitude aux mesures de longueur si les pièces se touchaient par ces lettres. Les pièces de 2 francs et de 1 franc sont, depuis la même époque, cannelées sur tranche.

Quant aux pièces d'or de 10 et de 5 francs, qui avaient d'abord été fabriquées en viroles lisses, elles sont maintenant frappées en viroles cannelées; conformément à l'article 3 du décret du 3 Mai 1848 (décision ministérielle du 22 Juillet 1854.)

TABLEAU DU POIDS ET DU DIAMÈTRE DES PIÈCES DE MONNAIE.

Dénomination des pièces.	Poids exact ou droit.	Tolérance en millièmes du poids.	Poids avec la tolérance.		Diamètre ou module en millièmes.
			En plus.	En moins.	
OR.					
fr. c.	gr.	mill.	gr.	gr.	mm.
100 00	32,258	1	32,290258	32,225742	35
50 00	16,129	2	16,161258	16,096742	28
40 00	12,90322		12,92903	12,8774	26
20 00	6,45161		6,46451	6,43871	21
10 00	3,22580		3,23225	3,21935	19
5 00	1,61290	3	1,61774	1,60806	17
ARGENT.					
5 00	25.	3	25,075	24,925	37
2 00	10.		10,05	9,95	27
1 00	5.	5	5,025	4,975	23
0 50	2,50	7	2,5175	2,4825	18
0 20	1.	10	1,01	0,99	15
CUIVRE ancien.					
0 10	20.	20	20,4	19,6	31
0 5	10.		10,2	9,8	27
0 2	4.		4,08	3,92	22
0 1	2.		2,04	1,96	18
CUIVRE nouveau ou bronze.					
Loi du 6 Mai 1852.					
0 10	10.	10	10,100	9,900	30
0 5	5.		5,050	4,950	25
0 2	2.	15	2,030	1,970	20
0 1	1.		1,015	0,985	15

(*) Excepté pour la pièce de 2 fr. qui a le même diamètre que l'ancienne pièce de 5 centimes en cuivre; mais la différence du métal et des types les distingue suffisamment.

L'ordonnance du 8 Novembre 1830, pour la fabrication des pièces de 100 et de 10 francs en or, n'a pas reçu son exécution.

Le décret du 3 Mai 1848 avait autorisé la fabrication des pièces d'or de 10 francs au diamètre de 19 millimètres, et des pièces d'argent de 20 centimes.

Les pièces d'argent de 25 centimes, qui ne sont pas décimales, ont été retirées de la circulation à mesure qu'elles rentraient dans les caisses publiques, et converties en monnaies nouvelles, en vertu du décret du 20 Avril 1852. Le cours forcé de ces pièces a cessé le 1er Octobre 1852.

Conformément au décret du 12 Janvier 1854, il a été fabriqué des pièces de 5 francs en or au diamètre de 14 millimètres et des pièces de 10 francs au diamètre de 17 millimètres. Mais le décret du 17 Avril 1855 ayant fixé le nouveau module des 5 francs à 17 millimètres, et celui des 10 francs à 19 millimètres, comme les 10 francs au type de la République, et prescrit le retrait des pièces de 10 francs du petit module de 17 millimètres; ces dernières pièces sont retirées de la circulation, et elles ont cessé d'avoir cours pour leur valeur nominale, le 15 Octobre 1855; à partir de cette époque, elles sont reçues au change de la Monnaie de Paris et payées en raison de leur poids et au titre de 900 millièmes, soit 3093 francs 30 centimes le kilogramme.

La première fabrication des pièces de 10 francs au nouveau module de 19 millimètres est du 4 Juin 1855, et celle des pièces de 5 francs en or, au module de 17 millimètres, est du 30 Octobre 1855.

Le décret du 12 Decembre 1854 a autorisé la fabrication des pièces d'or de 100 francs et de 50 francs; les poids et diamètres sont consignés dans le tableau au dessus.

La première fabrication des pièces d'or de 100 francs est du 27 Mars 1855, et celle des 50 francs, du 14 Juin 1855.

D'après la loi du 10 Juillet 1845, les pièces anciennes de 1 franc 50 centimes et de 75 centimes, créées par les lois du 28 Juillet et du 18 Août 1791, ont cessé d'avoir cours légal le 31 Août 1846.

Les pièces de 10 centimes en billon, créées par la loi du 15 Septembre 1807, ont cessé d'avoir cours légal et forcé à la fin de Décembre 1845, conformément à la loi du 10 Juillet 1845.

Les pièces de cuivre de 10 centimes (*un décime*) et de 1 centime qui sont en circulation, ainsi que les pièces de 5 centimes, avaient été créées par les lois des 3 Brumaire an V (24 Octobre 1796) et 29 Pluviôse an VII. (17 Février 1799) aux poids qui sont indiqués dans le tableau précédent; mais la tolérance de poids était de 40 grammes par kilogramme, dont moitié en dehors et moitié en dedans.

Les pièces de 3 centimes et de 2 centimes, décretées par la loi du 7 Germinal an XI (28 Mars 1803), n'ont pas été fabriquées.

L'ancienne monnaie de cuivre, imparfaite sous le rapport de l'art, a encore l'inconvénient d'être de toutes sortes de diamètre, poids, type et alliage; il a souvent été question de la remplacer par une monnaie de bronze uniforme, moins lourde, peu altérable, et exécutée avec toute la perfection possible, afin de la rendre plus difficile à contrefaire. Une loi, en date du 19 Avril 1852, promulguée le 6 Mai suivant, en a ordonné la refonte et le remplacement par une monnaie de bronze, pour une valeur égale à celle qui sera retirée de la circulation. Cette nouvelle monnaie de bronze est composée de 95 parties de cuivre pur, de 4 d'étain et d'une de zinc. (*Voir* le tableau du poids et du diamètre des pièces au dessus.)

Proportion de la Valeur des Métaux dans les Monnaies.

On désigne par la proportion d'un métal à un autre, servant tous deux de monnaie, le rapport de la valeur d'un kilogramme de monnaie du premier métal à celle d'un kilogramme de monnaie du second métal.

En d'autres termes: la valeur relative de l'or à l'argent résulte de la comparaison du prix courant ou légal de chaque sorte de monnaie avec la quantité proportionelle de métal pur qui s'y trouve contenu.

En France, dans notre système monétaire, la proportion de l'or à l'argent est—

de	15,5 à 1
de l'or au bronze, de	310,0 à 1
de l'argent au bronze, de	20,0 à 1
En Angleterre, l'or est à l'argent comme	14,28 à 1
En Belgique	15,79 à 1
En Espagne	15,75 à 1
En Portugal	15,48 à 1
En Russie	15,00 à 1
Aux Etats-Unis	15,98 à 1

Prix du Kilogramme d'Or et du Kilogramme d'Argent.

La retenue au Change des Monnaies pour frais de fabrication, déchets compris, ou la différence entre la valeur intrinsèque et la valeur nominale, était, du 17 Prairial an XI (6 Juin 1803) au 1er Juillet 1835, de 9 francs par kilogramme d'or et de 3 francs par kilogramme d'argent.

A compter du 1er Juillet 1835, cette retenue a été réduite à 6 francs pour l'or et a 2 francs pour l'argent. Et, à partir du 1er Octobre 1849, elle a été réduite, seulement pour l'argent, de 2 francs à 1 franc 50 centimes.

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A compter du 1er Avril 1854, la retenue, par kilogramme de matière d'or au titre de 900, a été portée de 6 francs à 6 francs 70 centimes, suivant le décret du 22 Mars 1854.

Cette augmentation de 70 centimes est motivée par la quantité proportionnelle de pièces à fabriquer par million d'or (décision du Ministre des Finances du 23 Mars 1854), savoir :

		fr.	k. gr.
en 20 francs	42,500 valant	850,000 et pesant	274,193
en 10 francs	10,000 „	100,000 „	322,580
en 5 francs	10,000 „	50,000 „	16,129
	62,500	1,000,000	322,580

Les espèces d'or de 100 francs et de 50 francs, fabriquées en exécution du décret du 12 Décembre 1854, ont nécessité, pour chaque nature de pièces, l'établissement d'une nouvelle fixation proportionnelle (décision du Ministre des Finances du 26 Mai 1855) :

		fr.	k. gr.
en 100 francs	200 valant	20,000 et pesant	6,451,6
en 50 francs	400 „	20,000 „	6,451,6
en 20 francs	36,250 „	725,000 „	233,870,5
en 10 francs	21,500 „	215,000 „	69,354,7
en 5 francs	4,000 „	20,000 „	6,451,6
	62,350	1,000,000	322,580,0

Les pièces divisionnaires d'argent à fabriquer par chaque million en pièces de 5 francs, sont fixées à la somme de 50,000 francs (décision du Ministre des Finances du 20 Avril 1854 :)

en pièces de 2 francs		les 4/20, soit	10,000 fr.
„ 1 franc		les 10/20, soit	25,000
„ „	50 centimes	les 5/20, soit	12,500
„ „	20 „	les 1/20, soit	2,500
			50,000

ANCIEN TARIF DU 17 PRAIRIAL AN XI (6 JUIN 1803).

Kilogramme.	Sans retenue ou au pair.	Avec retenue au change.
	fr. c.	fr. c.
Or - - - pur -	3444 44 4444	3434 44 4444
à 900m.	3100 0 0	3091 0 0
Argent - - pur -	222 22 2222	218 88 8889
à 900m.	200 0 0	197 0 0
TARIF DU 1ER JUILLET 1835.		
Or - - - pur -	3444 44 4444	3437 77 7777
à 900m.	3100 0 0	3094 0 0
Argent - - pur -	222 22 2222	220 0 0
à 900m.	200 0 0	198 0 0
TARIF DU 1ER OCTOBRE 1849. Décret du Gouvernement du 22 Mai 1849.		
Or - - - pur -	3444 44 4444	3437 77 7777
à 900m.	3100 0 0	3094 0 0
Argent - - pur -	222 22 2222	220 55 5555
à 900m.	200 0 0	198 50 0
TARIF DU 1ER AVRIL 1854. Décret du 22 Mars 1854.		
Or - - - pur -	3444 44 4444	3437 0 0
à 900m.	3100 0 0	3093 30 0
Argent - - pur -	222 22 2222	220 55 5555
à 900m.	200 0 0	198 50 0

TABLEAU DES FABRICATIONS D'ESPÈCES D'OR ET D'ARGENT FAITES EN FRANCE DEPUIS L'ETABLISSEMENT DU SYSTÈME DÉCIMALE (de 1793 à 1855.)

Désignation des types.	Or.	Argent.
	fr.	fr. c.
1er Rép. Hercule - -	„	106·237·255 0
Napoléon - - -	528·024·440	887·582·321 50
Louis XVIII. - - -	389·333·060	614·668·520 0
Charles X. - - -	52·918·920	631·914·637 50
Louis-Philippe - -	215·912·800	1·750·273·238 50
2e République, 1848		
Génie pour l'or - -	56·921·220	„
Hercule pour l'argent -	„	259·628·845 0
Déesse de la liberté -	371·479·830	199·471·488 0
Napoléon III. - -	1·114·989·180	85·813·707·40
	2.729.579.450	4.535.590.012.90
Total Général - -	7.265.169.462 francs 90 centimes.	

SAVOIR :

		fr.	c.	fr.	c.	fr.	c.
Or	-	100	0	2·726·100	0	2·729·579·450	0
		50	0	4·398·600	0		
		40	0	204·432·360	0		
		20	0	2·384·479·020	0		
		10	0	111·050·430	0		
		5	0	22·492·940	0		
Argent		5	0	4·363·482·175	0	4·535·590·012·90.	
		2	0	69·824·420	0		
		1	0	66·247·587	0		
		0	50	33·518·031	50		
		0	20	2·517·799	40		

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EXTRACTS from the Third and Fourth Reports of the Committee of the Legislative Assembly of Canada on DECIMAL CURRENCY, April 1855.

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The Americans have eagles, half-eagles, quarters, and dimes, but in accounts only dollars and cents are employed. Were England to adopt a decimal coinage, no other denominations than the pound and mil would be used in the day-book and ledger. The French have napoleons and deniers, but only use francs and centimes in book-keeping. Russia has sundry coins of gold, platinum, and copper, but all accounts are recorded in rubles and copecks, a copeck being the hundredth part of a ruble. So, too, in Holland; guilders and cents are the only money designated in the columns of account books, although there are ducats, crowns, and stivers in circulation.

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The Rev. Joshua Leavitt, of New York, while bearing testimony to the admirable qualities of the decimal currency for records, correctly asserts that for small circulation and payments in marketing, huckstering, and the like, a duodecimal coinage is also wanted, and preferable to the other. These small transactions of daily life far outnumber the dealings of commerce. The decimal currency admits of but one aliquot division—into halves; but the New York shilling, an eighth of a dollar, can be divided into sixths, quarters, thirds, halves, &c., and although Congress has never coined any shillings, the American people during sixty years have clung to their well worn shillings and sixpences, perceiving them to be a great public convenience. Your committee are of opinion that coins representing the eighth and sixteenth of a dollar are indispensable in small transactions in Canada, and that the smooth British sixpences will continue to pass extensively as the eighth of a dollar unless a better coinage is provided.

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From Rev. JOSHUA LEAVITT, Editor of the Independent, New York.

Your first question is "Do you desire to establish one currency of accounts and payments, having the parts and multiples in a decimal ratio?" I have no doubt of the superiority of the decimal system for the purposes of accounts, and am astonished that other countries have so long delayed its adoption. Our experience of the benefit of our federal currency in this respect is all one way. The saving of time and labour is prodigious, and the advantage in point of correctness and of the facility of detecting errors unquestionable. But for the purposes of small circulation, in marketing, huckstering, and the like, I am persuaded that a duodecimal currency like that of England, or like that which formerly prevailed in the city of New York, is far preferable. These small transactions of daily life outnumber the transactions of commerce almost infinitely. And it seems impossible to make a decimal currency as convenient in these as the old currency. One reason is, that the decimal currency admits of only one aliquot division, that is, into halves. The shilling can be divided into halves, quarters, thirds, sixths, and twelfths; and if it were needed, a coin of the value of two-thirds of a shilling would be found manageable. In all these countless small transactions which I have referred to, and in which every man is employed many times every day, this capability of subdivision is of great convenience. We are constantly buying a half of a thing, or a quarter, the eighth, the one-third, and so on. If the price is a dollar, we can make the change for one-half, for one-quarter, and if one, two, or more pence, with our decimal currency; but we cannot pay the exact price of one-third, one-sixth, one-eighth, one twelfth, or any other of the fractional parts. If the price is half-a-dollar, we can only pay for one-half, one-fifth, and one-tenth. If the price is a quarter of a dollar, we can pay for no aliquot division whatever. This is a constant inconvenience, and can be got along with in no other way than by disregarding small differences. Our Congress has attempted a partial remedy of the evil by coining three-cent pieces, of which the most remarkable quality is, that it is impossible to make

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change with them for any other American coin; and another is, that they do not conform to any known currency.

I think it is possible to combine the benefits of both systems, and that we in New York have accidentally stumbled upon the very plan which will do it. You are aware that in our marketing and other small transactions, our business is still done in shillings and pence, the shilling being one-eighth of a dollar, and therefore corresponding exactly in its value to the old Spanish coin of one-eighth. The provincial currency of New York, before the revolution, was framed upon the reckoning of eight shillings to a dollar; and when the federal currency was introduced in matters of coin, the common people still clung to the old shilling as a matter of necessary convenience in their pocket payments; and the experience of sixty years has not in the least diminished their attachment to this method of reckoning in small payments. Although all commercial accounts are kept in decimal currency, and all large payments are made in the same way; and although we have no coin that represents a shilling, and cannot make it by any combination of federal coinage, and are obliged still to use the old worn-out Spanish pieces that circulate above their value, this matter of convenience enables those smooth-faced coins to hold their ground, and to govern our methods of reckoning in our small transactions. And not only this, but we find that the people in all parts of the country are learning more and more to use the vernacular currency of New York in their daily chaffering. From one end of the United States to the other you will frequently hear people giving you the price of things in York shillings and York sixpences. I think this experiment is conclusive, and ought to be satisfactory to prove that the duodecimal currency in small transactions is a great public convenience. I am sure it is only this actual and felt convenience which has enabled it to maintain its ground for sixty years.

There is another consideration of some weight that I have never seen mentioned by any writer. The decimal currency is denominated by words expressive of the relative value of the different pieces to the one which is taken as the regulating unit; but it should be remembered that numbers are not names. No man calls his children one, two, or three. The shepherd names his sheep, the hunter his dogs, the little boy his chickens. It is a great convenience and satisfaction that our small coins should have names of their own.

The people in Canada can have a choice of two methods of carrying out the system which I suggest. One is, by adopting the federal currency of dollars, cents, and mils as the money of account, and the New York shilling and its parts for their petty cash. The other is, to adopt the pound sterling as their regulating unit, with the florin as the tenth, and the farthing as the one-thousandth part. Let this be the money of account; and then for a small currency adopt the English shilling, with its subdivisions down to the farthing. The result in either case will be a small difference between the actual value of the coin and the corresponding value of the money of account. *The difference is, in fact, four per cent.;* and, if it were not counterbalanced and averaged in practice, would be a matter of very considerable importance. But we find in fact that the prices of things which we buy in small quantities are regulated just in such a way as to afford a living profit; and if any profit is made by the dealer in consequence of this method of reckoning, competition will soon bring it about that the profits in prices will be reduced in proportion, and the petty losses which some people grumble about would be very much reduced also, if we were properly supplied with a duodecimal coinage. This loss of four per cent. takes place only when we have to employ the federal coins to pay or make change for duodecimal pieces. As all dealers receive as well as pay twelve cents for a shilling, the loss or gain must be about equal in most cases. At any rate there is no such inequality as ought to counterbalance the benefits of the shilling currency.

Although your Canadian currency is different from that which prevailed in colonial times, and therefore it would not be quite so easy for your people to fall into the use of the New York shilling, yet the proximity of your position, and the constantly increasing intercourse between the two countries, will greatly facilitate it. For myself, I have no idea that we shall ever abandon the shilling currency. The lapse of generations has only fixed it more firmly upon us; and I fully believe that in a few years we shall have a Congress so governed by common sense, and so alive to the convenience and welfare of the people, that they will legalize the York shilling and sixpence as the eighth and sixteenth of a dollar, and will give us from their own merit a corresponding coinage. The fact that we continue to use the worn-out, light, and depreciated Spanish coinage, ought to be considered a satisfactory proof of what public convenience actually requires.

Memorandum on the State of the Currency in Canada.

Coins.

By the Act 13 & 14 Vict. cap. 8, the legal value of the dollar and half-dollar is reduced from 5*s.* 1*d.* to 2*s.* 6$d\frac{1}{2}$. respectively to 5*s.*, to 2*s.* 6*d.* The Act authorizes the Governor in Council to cause silver and gold coin to be struck for circulation in the province, the expenses to be defrayed out of the Consolidated Revenue Fund; the silver

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coin to pass for 5*s.*, 2*s.* 6*d.*, 1*s.* 3*d.*, 1*s.*, 6*d.*, and 3*d.* currency each, to be a legal tender for 2*l.* 10*s.* The gold coins to pass respectively for 25*s.*, 20*s.*, 12*s.* 6*d.*, and 10*s.* currency each, to be a legal tender to any amount. By cap. 9, same Act, the legal value of the following silver coins of Spain, Peru, Chili, and Central America, South America and Mexico, being less than half-dollar, is reduced as follows: $\frac{1}{4}$ to 1*s.* 3*d.*, $\frac{1}{8}$ to 6*d.*, $\frac{1}{16}$ to 3*d.* currency, the silver dollar of the United States coined before 1841, and weighing less than 17 dwt. 4 grs. to pass for 5*s.*, the half-dollar for 2*s.* 6*d.*, the $\frac{1}{4}$ for 1*s.* 3*d.*, the $\frac{1}{8}$ for $7\frac{1}{2}$*d.*, and the $\frac{1}{16}$ for $3\frac{1}{2}$*d.* The British silver coin to pass for 6*s.* 1*d.*, the half for 3*s.* $1\frac{1}{2}$*d.*, the shilling for 1*s.* $2\frac{1}{2}$*d.*, the sixpence for $7\frac{1}{4}$*d.* The five-franc piece of France coined before 1841, and weighing not less than 16 dwts. is a legal tender for 4*s.* 8*d.* The British sovereign as in England, 1*l.* 4*s.* 4*d.* currency; halves in proportion. The United States eagle, 11 dwts. 6 grs. coined before 1834, 2*l.* 13*s.* 4*d.*; 10 dwts. 18 grs., coined since, 2*l.* 10*s.*; halves in proportion. The above is a legal tender so long as they do not want more than 2 grains of their proper weight, deducting one halfpenny for each quarter of a grain deficiency. In payment of over 50*l.* they must be paid or received, at the option of either party, at the following rates by weight, viz:—

	£	*s.*	*d.*	
The sovereign and eagle first mentioned	4	14	10	per oz. troy.
The eagle coined since 1834	4	13	0	„ „
The French 40-franc piece	4	13	1	„ „
Old doubloon of Spain, Mexico, Chili	4	9	7	„ „
Gold coins of La Plata and Columbia	4	9	5	„ „
Ditto of Portugal and Brazil	4	14	6	„ „

and their multiples and divisions, coined before the passing of the Act of 1841, may be weighed in bulk, and are a legal tender in sums not less than 50*l.* Gold of the United States, coined subsequent to 1841, to be a legal tender, in bulk, in sums of not less than 50*l.*, at the rate of 4*l.* 13*s.* per oz.

The penny of the United Kingdom, or any other that Her Majesty may cause to be coined of not less than the weight of 5-6ths of such penny, with divisions in proportion are a legal tender to the amount of 1*s.* currency, to pass for 1*d.*

By the Act 16 Vict. cap. 158. the denominations of money in the provinces are regulated as pounds, dollars, shillings, pence, cents, and mils; the dollar to be $\frac{1}{4}$ of a pound, the cent $\frac{1}{100}$ of a dollar, and the mil $\frac{1}{10}$ of a cent. The pound currency shall be held to be equivalent to represent 101 grains and $\frac{301}{1000}$ of a grain of standard gold. The copper penny of the United Kingdom shall pass for two cents, the copper halfpenny for one cent.

Amount of Coin in Circulation.

There is not any means of arriving at a correct estimate of the amount in circulation, as no returns bearing in any way on that subject are required by the Government. The proportion is, however, small as compared with the aggregate circulation in the province, all the banks issuing notes of so low a denomination as 5*s.* currency.

The only provincial metallic currency, as yet established in this province, is a certain amount of copper coins imported by some of the banks, under permission granted by an order of the Governor in Council, and these coins are a legal tender to 1*s.*

Accounts

Kept in Canada or Halifax currency, (the Act of 16 Vict. cap. 158. not having as yet come into force,) pounds, shillings, &c.; the pound currency is usually considered as equal to 18*s.* sterling, and relative value as 10 to 9. This is the standard of official salaries. The Currency Act of 1842, declares the pound currency to be such that the pound sterling, as represented by the British sovereign, shall be equal to 1*l.* 4*s.* 4*d.* currency; that is, the pound currency shall be equal to 16*s.* $5\frac{3}{4}$*d.* sterling.

Army sterling is at the rate of 4*s.* 2*d.* per dollar of 5*s.*

No. 24.

No. 24. Circular Queries.

Questions circulated by the Decimal Coinage Commissioners in Foreign Countries which have adopted a Decimal Coinage.

Present Money of Account.

1. What is the money of account at present established by law?

2. What are the subdivisions of such money of account?

3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?

4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?

No. 24.
Circular Queries.

Present Current Coins.

5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?

6. Are coins representing the lowest denomination of money of account, in common use?

7. What is the coin of lowest value in common use?

8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?

Former Money of Account and Coins.

9. What was the money of account before the introduction of the present system What were its subdivisions?

10. What was its legal value relatively to the present money of account?

11. What coins were current, and of what value, in the former money of account?

Change of Money.

12. When did the change take place?

13. What was the cause of the change?

14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?

15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?

16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?

17. If such inconveniences existed, by what classes of society were they chiefly felt?

18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?

19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?

20. In what way was the change effected?

21. Were the relative values of any of the coins previously in circulation changed?

22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?

23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?

24. Were any old names given to new coins, or new names to old coins?

25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?

26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?

27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?

28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?

29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?

30. Under such concurrent use, how do merchants and bankers keep their accounts?

31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?

32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?

33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?

1st. In paying and receiving—
(*a*) Large sums.
(*b*) Small sums.
2nd. In keeping accounts—
(*a*) In large transactions.
(*b*) In small transactions.

Weights and Measures.

34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?

35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?

36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?

General Que.

37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

No. 25.

FRANCE.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* EMPIRE OF FRANCE.

Sent through HER MAJESTY'S AMBASSADOR at Paris.

Monnaie de compte actuelle en France.

Q. 1. Quelle est la monnaie de compte légale actuelle?——

A. Il n'y a pas de monnaie de compte proprement dite. La monnaie réelle est également la monnaie de compte.
L'unité monétaire est le franc.

Q. 2. Quelles sont les subdivisions de cette monnaie de compte?——

A. Les subdivisions sont le décime et centime.

Q. Se sert-on en pratique de plus de deux dénominations de monnaie de compte, en exprimant ou en enregistrant des paiemens et des recettes, et quelles sont ces dénominations?——

A. Les seules dénominations dont on se serve sont le franc et le centime.

Q. 4. Quelle est la valeur de la plus grande et de la moindre unité de cette monnaie de compte en argent Anglais?——

A. Le franc représente la 25e partie environ de la livre sterling; le centime la 2,500e partie.

Monnaies courantes actuelles.

Q. 5. Quelles sont les monnaies courantes d'après la loi, et quelles en sont les valeurs respectives calculées en monnaie de compte aussi bien qu'en monnaies Anglaises, en distinguant entre l'or, l'argent, le cuivre, et le métal mixte?——

Monnaies courantes.

A. *Or.*—100f., 50f., 20f., 10f. et 5f.
Argent.—5f., 2f., 1f., 50c. et 20c.
Bronze.—10c., 5c., 2c. et 1 centime.
Il n'y a pas de monnaie en métal mixte.
Un souverain Anglais vaut en monnaies d'or et d'argent de France 25f. 20c.

Q. 6. Est-ce que les monnaies représentant la moindre dénomination de monnaie de compte sont en usage ordinaire?——

A. Le centime, qui est la pièce de la moindre valeur, est d'un usage ordinaire comme monnaie réelle et comme monnaie de compte.

Q. 7. Quelle est la monnaie de la moindre valeur qui entre dans les usages ordinaires?——

A. Le centime.

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Q. 8. Est-ce que l'on se plaint des monnaies de la moindre valeur en usage ordinaire, soit comme étant incommodément élevées, soit comme étant incommodément petites en valeur? Dans ce cas, quelles sont les classes de la société qui s'en plaignent?——

A. Aucune plainte n'a été formulée à cet égard.

Q. 9. Quelle était la monnaie de compte avant l'introduction du système actuel? Quelles en étaient les subdivisions?——

A. La livre était l'ancienne monnaie de compte.
Les subdivisions étaient le sou et le denier.

Q. 10. Quelle en était la valeur légale en la comparant avec la monnaie de compte actuelle?——

A. La valeur légale de la livre comparée à la monnaie de compte actuelle était de, environ 99 centimes; celle du sou, de 5 centimes; celle du denier ·415 centimes, soit un peu moins de la moitié du centime.

Or.—Le louis de 48 livres.
„ „ 24 „
Argent.—L'écu de 6 livres.
„ „ 3 „
La pièce de 30 sous.
„ „ 15 „
„ „ 24 „
„ „ 12 „
„ „ 6 „
Cuivre.—La pièce de 2 „
„ „ 1 sou.
„ „ 2 liards.
„ „ 1 liard.
Métal mixte (*argent et cuivre*).—La pièce de 6 liards.

Changement de Monnaie.

Q. 12. A quel époque le changement a-t-il eu lieu?——

A. En 1793, loi du 15 Aôut.

Q. 13. Quelle fut la cause du changement?——

A. La nécessité de mettre la monnaie en rapport avec le système décimal métrique.

Q. 14. Le changement a-t-il eu lieu par suite de quelques inconvénients, de quelque confusion, ou de quelque complication dans l'état de la circulation monétaire ancienne?——

A. Non, mais il a eu pour effet de simplifier les calculs.

Q. 15. Y avait-il dans la circulation monétaire ancienne des inconvénients inhérents dans la valeur des unités, principales ou subordonnées, ou dans leurs proportions relatives?——

A. Les rapports de valeur qui existaient entre les différentes unités monétaires rendaient les calculs compliqués et multipliaient les chances d'erreurs.

Q. 16. Les inconvénients (s'il y en avait) qui ont causé le changement ou qui y ont amené, se faisaient-ils sentir dans les paiements et dans les recettes d'argent, ou bien dans la tenue des livres?——

A. Les inconvenients se faisaient sentir principalement dans la tenue des livres.

Q. 17. Si de tels inconvénients ont existé, par quelles classes de la société ont-ils été le plus éprouvés?——

A. Ces inconvénients étaient sensibles pour toutes les classes de la société.

Q. 18. Le changement a-t-il été causé jusqu'à un certain point (et dans ce cas jusqu'à quel point?) par le désir d'assimiler la circulation monétaire à celle des pays voisins? Alors, la nouvelle monnaie a-t-elle été mise en usage, soit comme monnaie de compte, soit comme monnaie de change, avant d'être établie par la loi?——

A. Le changement n'a pas été opéré dans le but d'assimiler la circulation monétaire à celle des pays voisins. La France a été la première nation qui ait adopté le système décimal métrique des poids et mesures.
La monnaie décimale n'a été mise en usage comme monnaie de change et comme monnaie de compte, qu'après avoir été établie par la loi.

Q. 19. Ou bien ce changement a-t-il eu lieu jusqu'à un certain point (et dans ce cas jusqu'à quel point) par suite d'une simple prédilection pour la division de monnaie décimale, comme étant plus avantageuse que la division non-décimale?——

A. Voir l'annotation ci-dessus.

Q. 20. De quelle manière le changement a-t-il été effectué?——

A. 1°. La loi a interdit d'employer les anciennes dénominations de la monnaie de compte dans les actes publics, les sous seing-privé, registres de commerce, et autres écritures privées produites en justice.
2°. Les nouvelles monnaies émises ont été fabriquées dans la coupure du système décimal métrique.
3°. Les anciennes monnaies ont été successivement retirées de la circulation.

Q. 21. Est-ce que les valeurs relatives de quelques-unes des monnaies précédemment en circulation ont subi quelque changement?——

A. Aucun changement n'a été fait dans les valeurs relatives des anciennes monnaies.

Q. 22. Y a-t-il eu une sortie de nouvelles monnaies (et dans ce cas des quelles) avant et au vu et au su du changement, ou simultanément avec le changement, ou après?——

A. Aucune émission de monnaie décimale n'a été effectuée antérieurement à la loi qui a changé le système monétaire.

Q. 23. Est-ce que l'on a fait retirer quelques-unes des monnaies précédentes de la circulation, et dans ce cas lesquelles?

Est-ce que quelques-unes (dans ce cas lesquelles) des anciennes monnaies ont été admises à circuler simultanément avec le changement, ou après?——

A. Toutes les anciennes monnaies ont été retirées successivement de la circulation.

Les anciennes monnaies ont été admises provisoirement à circuler avec les monnaies nouvelles, mais jusqu'au délai fixé par la loi pour la démonétisation.

Q. 24. A-t-on donné d'anciens noms à quelques-unes des monnaies nouvelles, ou de nouveaux noms à quelques-unes des anciennes monnaies?——

A. Les dénominations des monnaies décimales sont distinctes de celles des anciennes monnaies.

Q. 25. Les anciennes monnaies de compte des moindres dénominations étaient-elles exactement commensurables avec les nouvelles monnaies, et pouvaient-elles s'exprimer de la même manière?——

A. La valeur du liard et celle du denier ne peuvent pas être exprimées exactement en monnaie décimale.

Q. 26. Si elles n'étaient pas exactement exprimables, quel arrangement a été fait pour la liquidation des dettes contractées sous l'ancien système, et qui devaient être payées sous le système nouveau?

Ou dans le cas de la perception des droits de barrières fixes, de péages, et autres droits appartenant à des particuliers, ou aux corps municipaux ou publics, ou à l'état, qui auraient pu acquérir ces droits sous l'ancien système, ou dans le cas d'autres engagements fixes?——

A. L'impossibilite d'exprimer exactement la valeur du liard et du denier en monnaie décimale n'a aucune importance en ce qui touche la liquidation des dettes contractées sous l'ancien système, puisque la différence pour chaque compte ne porte en définitive que sur la fraction du centime.

En ce qui concerne la perception de droits de barrières, de péages, &c., les tarifs ont été modifiés par des lois et des réglements spéciaux. Les nouveaux droits ont été exprimés en francs et centimes.

Q. 27. Le changement de la monnaie de compte fut-il graduel ou immédiat? Fut-il volontaire ou obligatoire? Dans le dernier cas, comment et sous quelles amendes a-t-il été mis en vigueur? A-t-il été mis en vigueur efficacement? ou l'ancien système est-il resté en usage pendant quelque temps et pendant combien de temps pour les comptes ou dans les habitudes populaires?——

A. Le changement, d'abord facultatif, a été ensuite rendu obligatoire; l'emploi des anciennes dénominations a été interdit sous peine d'amende.

L'amende était de 20f. pour les officiers publics et de 10f. pour les autres contrevenants. Les nouvelles dénominations ont été admises dans un bref délai, cependant quelques personnes ont continué à se servir, dans le langage, de quelques-unes des anciennes dénominations.

Q. 28. Si le changement a été volontaire, le nouveau et l'ancien système sont-ils restés en usage conjointement pendant quelque temps et existent-ils toujours conjointement?——

A. L'annotation qui précède indique que le changement a été obligatoire.

Q. 29. Y a-t-il eu des inconvénients et de quelle nature par suite de cet usage concourant des deux systèmes? Comment cet usage concourant affecte-t-il les comptes, les billets de banque, et les lettres de change?——

A. Depuis la promulgation de la loi, les comptes ont toujours été réglés d'après le nouveau système, c'est-à-dire, en francs et centimes.

Q. 30. Sous cet usage concourant, comment les marchands et les banquiers tiennent-ils leurs comptes?——

A. L'annotation précédente répond à cette question.

Q. 31. Le changement a-t-il été fait efficacement, ou y a t-il quelques classes de personnes, et lesquelles, et dans quelle partie du pays, qui persistent à se servir des anciennes dénominations en parlant ou dans la tenue des livres?——

A. Quelques personnes appartenant aux classes les moins élevées emploient encore dans le langage les anciennes dénominations, et confondent, sous la même désignation, le franc et la livre, le sou et la pièce de 5 centimes; mais les dénominations anciennes ne sont plus admises dans la tenue des livres.

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Q. 32. Ce changement a-t-il été mal vu par quelques classes de la société (et dans ce cas par lesquelles) au moment de son introduction ? Dans le cas affirmatif, ce préjugé a-t-il été transitoire ou permanent? Existe-t-il à l'heure qu'il est ? Le changement a-t-il donné lieu à quelques commotions ou malaise parmi les populations ?

A. Ce changement a été accueilli favorablement par toutes les classes de la société en général. Il n'a donné lieu à aucune commotion, ni à aucun malaise parmi les populations, et n'a rencontré d'opposition que dans un petit nombre de personnes routinières qui ne voulaient pas prendre la peine de se familiariser avec le nouveau système.

Q. 33. La nouvelle monnaie est-elle plus ou moins commode que l'ancienne, et quels en sont les avantages et les inconvénients ?

1°. En payant et en recevant,—(*a*) Les fortes sommes. (*b*) Les petites sommes.

2°. Dans la tenue des livres,—(*a*) Pour les grandes affaires. (*b*) Pour les petites affaires.

A. La nouvelle monnaie est incontestablement d'un usage plus commode que l'ancienne pour la recette et le paiement des petites et des fortes sommes.

Elle simplifie les calculs et facilite la tenue des livres.

Poids et Mesures.

Q. 34. Les poids et mesures sont-ils divisés selon le système décimal ? Dans ce cas, cette division décimale a-t-elle précédé, accompagné, ou suivi la division décimale des monnaies? Quel rapport y avait-il entre la division décimale des monnaies et celle des poids et mesures ?——

A. Les poids et mesures sont divisés selon le système décimal sans aucune exception.

La division décimale a été adoptée pour les monnaies, en même temps qu'elle a été établie pour les poids et mesures. Mais elle n'a pu être appliquée que successivement et après un long délai en raison des difficultés que présentaient le retrait des monnaies de l'ancien système et leur remplacement par des monnaies décimales, et à cause de la dépense que cette opération devait occasionner à l'état.

Un rapport parfait existe entre la division décimale des monnaies et celle des poids et mesures.

Q. 35. S'il n'y avait pas de rapport entre les deux divisions ci-dessus indiquées, est-ce qu'il ne s'est pas présenté des inconvénients à cause du manque du rapport ?——

A. Voir le 2° paragraphe de l'annotation ci-dessus.

Q. 36. Comment une division décimale de monnaies s'accorde-t-elle avec une division non-décimale de commodités dans les affaires de détail parmi les classes pauvres ? Leur en résulte-t-il des inconvénients ou des pertes ?——

A. Le prix des objets de consommation, et tous objets quelconques, peut toujours être mis en rapport avec la coupure des monnaies.

No. 26. France. — M. Chevalier.

No. 26.

LETTER from M. MICHEL CHEVALIER to LORD MONTEAGLE; with ANSWERS to QUERIES proposed by the DECIMAL COINAGE COMMISSIONERS, *so far as regards* the EMPIRE OF FRANCE.

CONSEIL D'ÉTAT, Paris, le 16 Avril 1856.

J'AI été très flatté de recevoir de vos nouvelles. Vous trouverez ci-jointe ma réponse aux questionsimprimées que vous m'avez fait l'honneur de m'adresser au sujet des monnaies décimales.

La transformation du vieux système monétaire de la France a eu lieu comme une partie du changement général de nos poids et mesures, changement général qui fut ordonné dès le début de la Révolution de 1789, en vue d'arriver à un système universel des poids et mesures, et auquel un décret spécial de l'Assemblée Constituante avait convié l'Angleterre à coopérer, mais qui ne fut accompli que sous la République.

Vous savez aussi bien que moi que toutes les parties de notre système nouveau des poids et mesures, connu sous le nom de système métrique, sont solidaires et liées entr'elles par des rapports décimaux, de même qu'elles sont toutes caracterisées par des sous-divisions décimales et des multiples décimaux. C'est en cela que consiste le principal avantage du système ; c'est cette double décimalité qui en fait l'excellence.

De toutes les parties de l'entreprise du système nouveau des poids et mesures, le renouvellement du système monétaire est celle qui a souffert le moins de difficulté dans l'application. Au surplus le système métrique lui-même n'a rencontré dans son ensemble aucune difficulté sérieuse, mais la résistance a été absolument nulle en ce qui concerne les monnaies.

Relativement au système métrique consideré dans son ensemble, et spécialement en dehors de la monnaie, l'obstacle est venu plutôt des classes bourgeoises et non pas des gens de métier, artisans et ouvriers des villes ; ces derniers en effet ressentaient le bienfait du système métrique par la facilité qu'ils y trouvaient pour les calculs de leur profession quelle qu'elle fût. Les classes bourgeoises, cette partie du moins qui vit dans une sorte de loisir sans se mêler aux professions manufacturières, résistaient quelque peu, par routine.

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Mais relativement aux monnaies aucune classe n'a résisté. Il y a bien eu çà et là quelques routiniers, mais ils ont été à l'état passif et presque honteux. C'est que tout le monde sans exception a journellement des comptes d'argent à faire, et chacun peut reconnaître d'un clin d'œil la commodité du système des monnaies décimales, de même que chacun peut en apprendre la pratique en un tour de main.

La seule objection qu'on puisse faire au système des monnaies décimales, objection qui s'applique au système métrique tout entier, est celle-ci : qu'on n'y peut pas pousser loin la division binaire. Cette difficulté est inhérente, à ce que le nombre dix est divisible par deux, mais ne l'est pas par $2 \times 2 = 4$, tandis que le nombre douze l'est. C'est un inconvénient irrémédiable à moins de changer le système même de numération, c'est à dire la méthode usitée pour écrire les nombres en chiffres dits arabes, et de substituer le nombre douze au nombre dix, de telle sorte que ce soit douze et non pas dix que s'écrive par l'unité suivie d'un zéro (10), et c'est une chose à laquelle il ne faut pas songer, car certainement le systéme de numération a été adopté une fois pour toutes. Le désir de pousser plus loin la division binaire avait fait adopter, dans les anciens systèmes, la sous-division par douze et quelquefois par seize ; mais il faut remarquer que ces anciens systèmes, à l'époque où ils avaient été fixés, étaient à l'usage de peuples parmi lesquels peu de personnes savaient écrire, et où l'on comptait de tête. On peut même faire cette autre remarque, qu'à cette époque les chiffres arabes étaient peu usités. Aujourd'hui presque tout le monde écrit et calcule avec la plume, au lieu de calculer de tête. Le système décimal de numération reprend tous ses avantages.

La divisibilité par quatre a son prix. Mais peut-on la comparer avec la facilité qui résulte de ce que les divisions et les multiples suivent la même loi que celle qui règle le système de numération ?

Pour ce qui est des monnaies en particulier, l'inconvénient de ne pouvoir pousser loin la division binaire s'évanouit à peu-près du moment que la sous-division du franc en pièces de valeur successivement plus faible est poussée jusqu'au degré qui est représenté chez nous par le centime. En supposant (ce qui n'est pas chez nous) qu'on voulût suivre indéfiniment la division binaire dans la mesure des marchandises, les comptes en argent se feraient aisément à un centime près, et qui est-ce qui peut s'arrêter à la somme d'un centime ?

Ce que vous appelez, Milord, le *concurrent use* des deux systèmes n'a jamais eu lieu depuis l'adoption du système métrique, chez nous, que pour les sommes au dessous d'un décime (à peu-près un penny) je pourrais même dire d'un demi-décime ou cinq centimes. Il y a eu pour ce *concurrent use*, qui au surplus a été confiné au dernier échelon du commerce de détail, une excellente raison pratique ; les sous-divisions au dessous d'un demi-décime n'existaient pas à l'état de pièces monnayées. Au dessous du demi-décime ou cinq centimes on n'avait que le liard ou quart de sou. Si dès l'origine on eut monnayé beaucoup de centimes, le *concurrent use* n'aurait pas eu lieu.

Vous me demanderez pourquoi l'on ne frappait pas des centimes. Ce n'était point par respect pour un sentiment d'affection des masses populaires pour le liard ; c'était simplement par un sentiment d'économie fort mal entendu. La pièce d'un centime et celles de deux centimes sont assez couteuses de fabrication par rapport à la valeur. Les directeurs des monnaies n'auraient consenti à en frapper des quantités que moyennant un subside qu'on n'aimait pas à leur donner.

Je serai toujours heureux, Milord, de contribuer de mes faibles avis et de mes faibles efforts à toute entreprise d'utilité publique à laquelle vous apporterez le puissant concours de vos lumières et de votre influence. Tout renseignement qui serait en mon pouvoir dans la circonstance actuelle et dans toute autre est à votre service.

Rien ne peut m'être plus agréable que de voir les deux grandes nations de l'occident de l'Europe se rapprocher l'une de l'autre, par le rapprochement de leurs usages et de leurs lois ; toutes les fois qu'il me sera donné d'y coopérer, je me tiendrai pour l'obligé de ceux qui m'en auront fourni l'occasion.

Veuillez agréer, Milord, l'assurance de ma haute considération et de mes sentiments dévoués.

MICHEL CHEVALIER,
73, Rue de l'Université.

P.S.—Il ne sera peut-être pas inutile que je transcrive ici un extrait d'une lettre que M. de Bruck, le Ministre des Finances de l'Autriche a adressée il y a peu de temps, au comité qui s'est formé à Paris, à la suite de l'Exposition Universelle de l'Industrie, pour recommander l'adoption générale parmi les peuples civilisés d'un système uniforme des poids et mesures.

" * * * * Je puis à cette occasion porter à votre connaissance, Messieurs, que le " Gouvernement Impérial d'Autriche est disposé à introduire le demi-kilogramme comme " poids monétaire, avec la division par millièmes, et à adopter également pour les mon- " naies d'or et d'argent la loi ou titre de $\frac{9}{10}$ de fin et $\frac{1}{10}$ de cuivre ou alliage, ce qui " répondrait déjà en deux points essentiels au but que l'Association Internationale se " propose d'atteindre."

" Vienne, 8 Mars 1856."

Le très Honorable Lord Monteagle,
de la Commission des Monnaies Décimales.

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France.

M. Chevalier.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. Le franc.

Q. 2. What are the subdivisions of such money of account?——

A. Sous-divisions, le décime et centime, ou plus simplement le centime.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Dans les comptes, on ne se sert que de deux dénominations, le franc et le centime.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. Je ne saisis pas bien cette question. Le franc fait un peu moins de 10 pence.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. Les pièces de monnaie sont,—

En argent, de 5f. 2f. 1f. 50c. 20c.
En or, - 100f. 40f. 20f. 10f. 5f.

Les pièces les plus abondantes sont 5f. en argent; 20f. en or. La pièce de 100 francs existe peu et ne devrait pas exister, puisqu'il y a des billets de banque de 100f.

En cuivre ou bronze, il y a des pièces de 10c., 5c., 1c. L'émission de pièces de 2 centimes, est aussi ordonnée; mais il n'y en a pas encore beaucoup dans la circulation. Je n'en ai jamais vu de l'ancienne émission. Quant à la nouvelle, posterieure aux évenèments de 1851, (loi de 6 Mai 1852) on en rencontre peu. Il en a été fabriqué cependant un montant de 351,339f. 40c. au 31 Décembre 1853. Depuis lors la quantité a du augmenter.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Les pièces de 1c. sont encore rares; mais on en frappe.

Q. 7. What is the coin of lowest value in common use?——

A. La pièce de 5 centimes.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by ny and which classes in society?——

A. La pièce de 5 centimes est un peu trop forte pour le solde des achats de peu de valeur; mais il y était pourvu au moyen des vieilles pièces de billon d'une valeur de moins de cinq centimes.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. La livre, avec les sous-divisions le sou et le denier. La livre, le sou, et le denier avaient entre elles le même rapport que la livre sterling, le schelling et le denier de l'Angleterre. Une livre faisit 20 sous, et le sou 12 deniers.

Q. 10. What was its legal value relatively to the present money of account?——

A. 81 livres font 80 francs.

Q 11. What coins were current, and of what value, in the former money of account?——

A. Il y avait des pièces en argent de 6 livres, de 3 livres, de 30 sous, de 24 sous, de 15 sous, de 12 sous et de 6 sous; pièces en or de 24 et 48 livres. En cuivre, c'étaient la pièce de 2 sous, le sou, et le liard ou quart de sou représentant 3 deniers.

Change of Money.

Q. 12. When did the change take place?——

A. Sous la République, à l'époque du Directoire, en vertu de mesures dont le commencement datait de l'Assemblée Constituante.

Q. 13. What was the cause of the change?——

A. La volonté d'avoir un système décimal de poids et mesures y compris la monnaie.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. Répondu sous le No. 13.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subord nate units, or in their proportions to each other?——

A. On ressentait l'inconvénient de ne pas avoir les divisions décimales.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?——

A. Répondu au No. 15.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. L'inconvénient était sensible pour les commerçants et les employés des services financiers.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was estabised by law?——

A. Non.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. Oui.

Q. 20. In what way was the change effected?——

A. Par l'adoption du système décimal général des poids et mesures.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. Non, pas sensiblement, et même pas du tout, faut qu'on tînt compte du frai moyen de chaque espèce de pièce et qu'on adoptât en centimes des nombres ronds divisibles par 10 ou par 5. Ainsi le décret du 12 Sept. 1810, et celui du 18 Août de la même année posèrent les termes suivants :—

		f.	c.
Ecu de 6 livres	=	5	80
——— 3 livres	=	2	55
Pièce de 24 sous	=	1	
——— 12 sous	=	0	50
——— 6 sous	=	0	25

Q. 22. Where any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. Oui; on a fabriqué en masses des monnaies nouvelles, à partir de la promulgation de la loi.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. Les anciennes monnaies circulaient avec les nouvelles; mais d'après un tarif qui fixait la valeur de chaque sorte des pièces anciennes en monnaie nouvelle. Voir le No. 21. C'est seulement fort tard par la loi du 14 Juin 1829, qui fixait le terme du 1 Avril 1834, qu'on a démonétisé les pièces anciennes. Pour les pièces de cuivre la démonétisation n'est pas encore un fait accompli, mais ce sera fait en 1856. Si l'on tarda à démonétiser les vieilles pièces d'or et d'argent, ce n'est pas que les populations y fussent attachées; tout le monde, au contraire, les trouvait incommodes. Ce ne fut que par un effet de la lenteur de l'administration à prendre un parti.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. Les pièces nouvelles ont eu leurs noms en francs. Par corruption, la pièce de 5 centimes s'appela un sou dans le langage ordinaire.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. Le sou a été assimilé à 5 centimes; mais c'est un billon et non pas de la monnaie. Le vieux sou a circulé comme pièce de 5 centimes, jusqu'à cette année où il sera définitivement retiré, ce qui aura lieu cette année.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. Quant aux dettes, il n'y avait pas de difficulté; 81 livres se sont changées en 80 francs. Pour ce qui est des péages des ponts and autres choses semblables qui étaient d'un faible montant, c'était engénéral exprimé en sous et liards; or on confondait le sou et la pièce de 5 centimes, et le liard a continué de circuler; et puis le publique n'attache pas d'importance pour des sommes de cet ordre à une fraction.

Il y avait à cette époque peu de péages; il en fut établi sous le Directoire, un sur les routes, au profit de l'état. Mais dès que c'était au profit de l'état il n'y avait pas de difficulté; et d'ailleurs les péages nouveaux s'exprimaient en monnaie nouvelle.

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Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. Pour les particuliers, le changement fut facultatif et non obligatoire ; il fut forcé pour les administrations publiques et les officiers publics. Maisla commodité du nouveau système était telle que les commerçants l'adoptèrent aussitôt.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. Quelques petits marchands ou fournisseurs, n'ayant pas de livres de comptabilité régulièrement tenus, gardèrent seuls les comptes par livres, sous et deniers.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. Les billets de banque et les lettres de change sont en francs.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. En francs.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. La seule chose qui reste dans les usages, c'est le nom du sou.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. Le changement n'a éprouvé aucune difficulté.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving.—(*a*) Large sums. (*b*) Small sums.
2nd. In keeping accounts.—(*a*) In large transactions. (*b*) In small transactions.

A. Le nouveau système a sous tous les rapports une supériorité reconnue, sur l'ancien.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. La France a d'une manière générale le système décimal pour les poids et mesures. Le système français dit métrique a été édifié tout d'une pièce ; y compris la monnaie.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. Il ne pourrait y avoir de difficulté que si l'on manquait de mêmes pièces en cuivre. Mais on a eu longtemps les liards comme division inférieure au sou, ou à la pièce de 5 centimes ; maintenant on a et va avoir encore plus la pièce de 2 centimes et le centime.

(Signé) MICHEL CHEVALIER.

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France.

M. Delessert.

LETTER from M. GABRIEL DELESSERT to Lord MONTEAGLE ; with ANSWERS to CIRCULAR QUERIES proposed by the DECIMAL COINAGE COMMISSIONERS, *so far as regards the* EMPIRE OF FRANCE.

Mon cher Lord Monteagle, Passy, 8 Avril 1856.

LE 30 du mois passé j'ai eu l'honneur de vous écrire pour vous demander un délai de quelques jours pour satisfaire aux questions que vous m'avez envoyées sur l'établissement du système décimal tant pour les monnayes que pour les poids et mesures. Aujourd'hui je viens m'acquitter de cette dette fort agréable envers vous, en vous retournant avec la présente les questions et les réponses, que j'ai faites de mon mieux.

J'ai cru devoir y joindre la collection des loix et décrets rendus sur cette matière depuis l'origine du système nouveau, ainsi que l'almanach du Bureau des Longitudes, qui vous fournira des renseignements également utiles sur cette matière.

Les sommes deposées aux caisses d'épargne ont toujours depuis l'établissement de ces institutions été calculées en monnayes décimales.

Le système décimal n'a jamais excité des murmures que pour les très petites transactions, sur les marchés et chez les boulangers.

Le système duodécimal aurait peut-être encore des partisans, mais celà serait fort discutable et fort discuté.

Permittez moi, mon cher Lord Monteagle, de vous renouveler l'expression de mes sentiments de haute considération et de dévouement.

GABRIEL DELESSERT.

No. 27.
France.

M. Delessert.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. Il n'y a point en France de monnaye de compte.

Q. 2. What are the subdivisions of such money of account?——

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. Les Questions 2, 3, et 4 trouvent l'absence de réponse dans la non-existence en France de monnaye de compte.

Present Current Coins.

Q. 5. What are the coins current by law and in general circulation, and what is their respective value in the money of account as well as in coins of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. Voici l'état indicatif des diverses espèces monétaires ayant actuellement cours en France; savoir (l'evaluation ou change de fr. 25 pour 1 livre sterling):—

		£	s.	d.
Or.				
Pièces de 100 francs	=	4	0	0
„ 50 „	=	2	0	0
„ 40 „	=	1	12	0
„ 20 „	=	0	16	0
„ 10 „	=	0	8	0
„ 5 „	=	0	4	0
Argent.				
Pièces de 5 „	=	0	4	0
„ 2 „	=	0	1	7
„ 1 „	=	0	0	$9\frac{1}{2}$
„ 50 centimes	=	0	0	$4\frac{3}{4}$
„ 20 „	=	0	0	$1\frac{9}{10}$
Billon.				
Pièces de 10 centimes	=	0	0	1
„ 5 „	=	0	0	$0\frac{1}{2}$ penny.
„ 2 „	=	0	0	$0\frac{2}{5}$ de half penny.
„ 1 „	=	0	0	$0\frac{1}{5}$ de half-penny.

L'évaluation du billon portée ici est approximative.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Pas de réponse à cette question toujours à cause de l'absence de monnaye de compte.

Q. 7. What is the coin of lowest value in common use?——

A. La pièce de la moindre valeur dans la monnaye courante est la pièce d'un centime.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?

A. On ne se plaint point au sujet de la pièce d'un centime, comme offrant des inconvénients par sa valeur, ou trop basse ou trop élevée; cependant, dans les campagnes, et sur les marchés alimentaires fréquentés par les classes ouvrières, on s'est plaint quelquefois qu'il n'y eût pas en circulation une plus grande quantité de ces monnaies de petite valeurs.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its sub-divisions?

A. Pas de monnaye de compte.

Q. 10. What was its legal value relatively to the present money of account?

A. Idem.

Q. 11. What coins were current and of what value in the former money of account?

A. Double Louis de 48 livres tournois.
Louis de „ 24 „
Ecus de „ 6 „
Ecus de „ 3 „
Pièces de „ 1 livre et demi ou 30 sols.
Pièces de „ 15 sols.

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Change of Money.

Q. 12. When did the change take place?

A. Le 11 Decembre 1793 (17 Frimaire an III.) la Convention rendit un décret, par lequel il était ordonné que tous les comptes et marchés des dépenses publiques fussent tenus en livres décimes et centimes.

Le 15 Août 1795 (23 Thermidor an III.) décret de la Convention ordonnant que l'unité monétaire porterait à l'avenir le nom de franc, et qu'elle serait subdivisée en décimes et centimes.

Mais c'est la loi du 7 Germinal an XI., soit 28 Mars 1803, qui a réelement fait la base du système nouveau.

Q. 13. What was the cause of the change?

A. L'idée de simplifier le système des monnayes, de lui donner une base plus rationnelle, et d'un usage plus facile, peut-être aussi une intention d'opposition, ou de haine contre l'ordre de choses que l'on venait de renverser Au termes des loix nouvelles 5grammes d'argent au titre de neuf dixième. constitue le franc.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?

A. Beaucoup d'inconvénients résultaient de la division des anciennes monnayes; le système décimal admis aussi pour toutes espces de mesures, parût simplifier avantageusement les monnayes, ainsi que toutes les opérations monétaires.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?

A. On trouvait des inconvénients dans l'ensemble comme dans le détail des monnayes ainsi que dans leurs subdivisions.

Q. 16. Were the inconveniences (if any) which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?

A. C'était autant pour les payements que pour les recettes que l'on trouvait qu'il y avait des inconvénients dans le vieux système.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?

A. Principalement par les négociants et comptables de toutes espèces et plus particulièrement par les difficultés que présentait l'ancien système dans la tenue des comptes du Gouvernement.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries, and if so had the new money been rendered familiar by its use, either as a money of account or of exchange before it was established by law?

A. Non, il n'y eut aucune intention de ce genre, mais les divers états ou populations provenant de la conquête et réunis à la France, tels que la Belgique, les Provinces Rhenanes, la Savoye, le Piémont, &c. reçurent ainsi que celle des autres loix de l'empire l'application du système décimal.

Le système nouveau ne reçut point d'application sous forme d'essai, avant son établissement légal.

Q. 19. Or was the change caused by an abstract preference for a decimal division of money over a non-decimal division?

A. Malgré la répugnance qui accompagne ordinairement de grands changements dans les habitudes des populations, et les contrariétés qu'elles en ressentent, il est certain que le changement eut lieu par suite d'une préférence marquée dans la système décimal.

Q. 20. In what way was the change effected?

A. Par la publication et la mise à exécution des actes du Gouvernement cités plus haut; les actes du Gouvernement et de la trésorerie furent immédiatement rendus obligatoires; quant aux transactions diverses, commerciales, ou autres, comme aussi les opérations monétaires entre particuliers, comptes, &c. elles furent tolérées et point entravées alors.

La conversion de la monnaye de l'ancien système, en monnaye du nouveau, se faisait en ajoutant $1\frac{1}{4}$ pour $\frac{0}{0}$ à la livre tournois pour faire le franc.

Q. 21. Were the relative values of any of the coins previously in circulation changed?

A. Non; il y eut des désignations de valeur en nouvelles monnayes mais pas d'altération.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. Les nouvelles monnayes ont eu cours aussitôt après le changement et dès que l'office des monnayes en a eu de fabriquées.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. Les monnayes du système précédent ont continué à circuler librement pendant un grand nombre d'années, excepté celles effacées, ou usées par le

temps ; ce n'est que fort long temps après, que graduellement ces monnayes anciennes ont été démonétisées.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. Non, aucune substitution de ce genre n'a eu lieu.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. Pas dans la monnaye de compte puisqu'il n'y en avait pas, mais pour la monnaye courante, on représentait le sol en disant cinq centimes ; deux sols en disant une décime.

On disait bien dans l'expression de l'ancienne monnaye un liard pour $\frac{1}{4}$ de sol, deux liards pour un $\frac{1}{2}$ sol (ou sou); mais ces dénominations n'avaient pas d'expressions dans la nouvelle monnaye.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. Aucunes ; seulement, la différence de $1\frac{1}{4}$ % étant établie entre la livre tournois et le franc au profit du franc ; on faisait la réduction lorsqu'il s'agissait de sommes qui dépassaient celles tout à fait minimes.

Par exemple, dans la marche courante des petites transactions, on disait un sou, et on donnait cinq centimes ; on disait deux sous, et on donnait dix centimes, &c., sans pour cela faire la réduction de $1\frac{1}{4}$ % ; mais lorsqu'il s'agissait de six livres on demandait souvent le complement de $1\frac{1}{4}$ % ; cependant l'usage en était à peu près ad libitum, pour ces petites valeurs.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?

A. Le changement fut immédiatement fondé par la loi en attendant que l'habitude et l'usage vinssent à son secours, mais ce changement fut graduel et libre dans l'usage.

Il n'y eut donc pas de pénalités contre ceux qui ne l'adoptaient pas, jusqu'en 1837, plus de cinquante ans après l'établissement du nouveau système.

Le vieux système monétaire, ainsi que nous l'avons dejà dit, resta donc par tolérance en usage pendant un grand nombre d'années pour les transactions entre particuliers, dans le langage et les habitudes du peuple, et en particulier dans les provinces, moins à Paris, et très rarement dans les comptes de quelque importance.

Q. 28. If the change was optional did the old and new system contiuue in use concurrently for any time, and do they still continue in use concurrently?——

A. La réponse à la question précédente, No. 27, satisfait à celle-ci.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. Pas d'inconvénients notables, seulement quelque confusion par fois, dans les transactions entre particuliers. Il n'en résultait non plus aucun inconvénient rélativement aux billets de banque, et aux billets de change, puisque la réduction se faisait toujours de la livre au franc en ajoutant $1\frac{1}{4}$ pour cent à la livre pour faire le franc ; des tables de réduction avaient été imprimées et se trouvaient dans tous les bureaux, comptoirs, offices, études de notaires, &c.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. Presque à l'unanimité les négociants et banquiers tinrent leurs livres, ou compte, en francs, dès l'année 1800.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. Le changement est complètement exécuté depuis plus de 30 ou 40 ans; personne ne se sert des anciennes dénominations, sauf peut-être, mais bien rarement, sur les marchés de details, de celle de sols ; cela arrive aussi quelquefois aux cochers de voitures de place, et encore plutôt par exclamation que comme indication réelle.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. En France, malheureusement, notre esprit frondeur rend impopulaires presque toutes les mesures nouvelles provenant du Gouvernement ; les avantages en sont rarement appréciées avant que l'habitude en ait consacré l'usage ; cependant le changement des monnayes n'éprouve d'impopularité réelle que dans les classes inférieures, sur les marchés, dans les

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populations agricoles ; il était difficile de faire plier tout-à-coup les vieilles traditions aux habitudes nouvelles. Cette impopularité de la mesure diminua peu à peu et cessa sans effort. Le changement produisit des murmures, mais pas de révoltes, ni de commotions violentes.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?—

A. Il est généralement reconnu que la nouvelle monnaye est d'un usage plus commode et plus facile que l'ancienne, excepté cependant la monnaye inférieure pour laquelle un grand nombre de personnes auraient préféré le système duodécimal au système décimal.

1. In paying and receiving?

Pas de différence.

(*a.*) Large sums,

Non plus.

(*b.*) Small sums,

Peut-être pour les très petites transactions tant alimentaires que d'autres sortes, le système nouveau aura-t-il trouvé des opposants.

2. In keeping accounts?——

(*a.*) In large transactions,

(*b.*) In small transactions.

Pour la tenue des comptes en grand comme en petit, le nouveau système est reconnu infiniment plus commode et préférable.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. Oui, pour toutes espèces de mesures quelconques le système en usage en France pour les poids et mesures est décimal.

Le décret de la Convention du 1 Août 1793 a fondé ce système sur la mesure du méridien de la terre. Un décret du 7 Avril 1795 a confirmé, developpé, et régularisé ce système. L'un et l'autre de ces décrets comprennent le système monetaire du franc et la division par centimes dans ce changement. Des délais furent accordés, et ce n'est que la loi du 4 Juillet 1837 rendue sous le règne du Roi Louis Philippe, qui a défendu l'emploi des anciennes mesures et l'emploi de leurs dénominations. Lesquelles défenses furent accompagnées de diverses penalités, amendes, &c. &c.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. Il ne résulterait peut-être pas de grands inconvénients de ce défaut de similitude entre le système décimal des poids et mesures, et le système décimal monétaire, il semble, cependant, que leur uniformité offre de grands avantages.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?

A. Il nous semble que ce sont des inconvénients provenants de changements dans les habitudes et dans l'usage plutôt que des pertes pour les classes pauvres qui pourraient résulter de ce changement, surtout si le Gouvernement avait le soin de mettre en circulation une quantité suffisante des très petites fractions monétaires.

A Paris, on s'est plaint plusieurs fois de ne pas avoir une quantité suffisante de centimes en circulation, c'était plus particulièrement relativement au commerce de détail des boulangers que ces plaintes étaient proférées.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. Tous les depôts faits dans les caisses d'épargne, ou toutes autres institutions quelconques, charitables, hospitalières, civiles ou militaires, sont depuis de longues années soumis au calcul décimal.

Nous le répétons encore une fois, les mesures décimales de toutes sortes sont universellement adoptées et en usage en France ; dans les magasins, boutiques, &c. &c. on ne sert jamais plus du mot aune, il y n'y a que le mot mêtre qui soit en usage ; également on ne parle plus que par litre, hectolitre, decalitre pour les mesures de capacité ; on ne dit plus guerre une lieue, mais presque toujours un kilomètre, dix kilomètres ; les personnes agées faisent peut-être par ancienne habitude le petit calcul d'un kilomètre pour

un quart de lieue, ou de quatre kilomètres pour une lieue de 2,000 toises, ou 4,000 mètres; quelques fois peut-être aussi, et toujours les gens agés, on dira un arpent, quatre arpents, lorsqu'il s'agira de mesures agraires, mais dès que cela sert de l'exclamation on revient bien vite à l'hectare, centiare, are, &c.

No. 27. France. — M. Delessert.

Quant au mesurage ancien et aux instruments d'anciennes mesures, la loi de 1837 les a formellement défendues, et c'est un délit puni par les loix que de s'en servir dans toutes espèces de transactions.

Passy.

G. DELESSERT.

No. 28.

No. 28. France. — Mercantile Correspondent.

ANSWERS to QUERIES proposed by HER MAJESTY'S COMMISSIONERS for inquiring into DECIMAL COINAGE, *so far as regards the* EMPIRE OF FRANCE, by the French Correspondent of a London Mercantile House.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. Le franc.

Q. 2. What are the subdivisions of such money of account?——

A. Les centièmes de franc.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Le franc seul.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. Le franc pèse 5 grammes, contenant 900 parties d'argent pur, et 100 parties d'alliage de cuivre en général.

1000 grammes = 1 kilogramme.
311 kilogrammes = 10,000 onces anglaises.

Donc 1 franc soit 4·5 grammes d'argent fin vaut $9\frac{385}{1000}$ deniers, en supposant le prix de l'argent standard à 60 deniers (il est en ce moment beaucoup plus élevé).

Present Current Coins.

Q. 5. What are the coins current by law and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A.—

Or.

Pièce de 100 francs } peu communes.
„ 50 „ }

Pièce de 20 „ pesant 6·450 grammes contenant 5·805 gr. or 0·645 gr. alliage.
„ 10 „ „ 3·225
„ 5 „ „ $1{\cdot}612\frac{1}{2}$

Argent.

Pièce de	5 francs	pesant	25 grammes	contenant 22·500	grammes argent.
„	2 „	„	10 „	9·500	„
„	1 „	„	5 „	4·500	„
„	0·50 centimes		2·500 grammes	2·250	„
„	0·20 „		1·000 „	0·900	„

* *Cuivre.*

Pièce de	0·10	„	10 grammes.
„	0·05	„	5 „
„	0·01	„	1 „

(Voir à la dernière page.)

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Les pièces de 10 et 5 centimes circulent beaucoup.

Q. 7. What is the coin of lowest value in common use?——

A. Le centime est d'une circulation peu commune; il est nécessaire pour des péages de ponts, le payement du pain, de la viande.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. Les centimes sont sans inconvénients mais peu utiles.

* La refonte de la monnaie de cuivre se fait, en ce moment, les pièces dont nous parlons ont un poids moitié plus faible que celui des pièces qu'on supprime.

No. 28.
France.

Mercantile Correspondent.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. La livre tournois. Il y avait—

Or.—Pièces de 48 livres.
„ 24 „
Argent.—Pièces de 6 „
„ 3 „
„ - „ 24 sols.
„ - „ 6 „
Cuivre.—Pièces de - „ 2 „
„ - „ 1 „
„ - „ - „ 2 liards.
„ - „ - „ 1 „

En 1793 on a frappé des pièces d'argent de 30 sols.
15 „

Q. 10. What was its legal value relatively to the present money of account?——

A. 80 livres tournois = 81 francs.

Depuis 1793 le Gouvernement a successivement modifié le prix en francs auquel les anciennes pièces devaient être recues; elle sont maintenant toutes démonétisées.

On tenait les comptes en livres, sols, et deniers:—
1 livre = 20 sols.
1 sol = 12 deniers.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. Toutes celles indiquées à la reponse 9.

Change of Money.

Q. 12. When did the change take place?——

A. La loi des monnaies est du 7 Germinal an XI., Bonaparte Consul. (Avril, 1803.)

La première loi est l'an I. (1793); on frappait encore des pièces de 6 livres et de 3 livres pendant cette année. La fabrication des monnaies décimales prit peu de dévelopement pendant les premières années, et ce n'est qu'en 1796 qu'on frappa des pièces de 20 francs et de 40 francs en or.

Q. 13. What was the cause of the change?——

A. L'esprit d'unité qui dominait alors, et le besoin d'assimiler en toutes choses toutes les parties de la France, sont les principales causes de changement.

On introduisit le système décimal non seulement pour les monnaies, mais pour tous les poids et toutes les mesures. Le système est complet et unitaire.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. Le système décimal est plus simple pour les calculs.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. Non.

Q. 16. Were the inconveniences (if any) which caused or promoted the change inconveniences felt in paying and receiving money or in account keeping?——

A. Pour payer et recevoir aucun; pour la tenue des comptes le système décimal est beaucoup plus simple.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. Par les commerçants pour les comptes.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. Non.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. Oui; et surtout pour introduire un système unitaire de poids et mesures dans toutes les parties du pays.

Q. 20. In what way was the change effected?——

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. Non.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. Non; après la publication du sytème nouveau, et pendant assez longtemps, on a fabriqué de pièces de 6 et de 3 francs.

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France.

Mercantile Correspondent.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. Toutes les anciennes monnaies ont continué à circuler avec les nouvelles; elles ont été plusieurs fois tarifées; en l'an XI. entr'autres, et en 1810. En cette dernière année le tarif fut:—

Pièces de	6 livres		=	5·80 francs.
„	3 „		=	2·75 „
„	48 „	or	=	47·20 „
„	24 „	„	=	23·55 „

On payait indifféremment en monnaies nouvelles, anciennes. En 1835, la refonte générale des anciennes monnaies fut décidée, et en 1836 elles cessèrent d'avoir cours.

Il y avait aussi des pièces de billon, 6 liards et 2 sols, qui ont été démonétisés en 1838.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. Non.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. Il y avait le rapport de 80 livres à 81 francs.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money, tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. Tous les engagements antérieurs en livres tournois étaient traduits en francs dans cette proportion.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. Ces questions sont déjà répondu. L'introduction des nouvelles monnaies s'est faite très lentement depuis 1793. Jusqu'en 1836 les anciennes monnaies ont légalement circulé; depuis longtemps la dénomination du franc est seule en usage; mais le sol est encore la dénomination commune, et le Gouvernement cependant punit d'amende l'emploi de la dénomination sol au lieu de 5 centimes.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. Toutes les anciennes monnaies ont été refondues.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. Aucun. Le franc est la seule monnaie de compte.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. En francs.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. Tout le monde, sans exception, compte en francs. J'ai dit que la dénomination de sol au lieu de 5 centimes est encore en usage général.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. Non; mais on a eu, tout naturellement, beaucoup de peine à changer les habitudes.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2nd, In keeping accounts.—(*a*) In large transactions. (*b*) In small transactions.

A. Plus commode.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. Oui; l'introduction a été simultanée.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. Tout est décimal.

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Mercantile Correspondent.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect? ——

A. La pièce de 20 francs contient 5·805 grammes d'or fin.

Le rapport du poids français au poids anglais est de 311 kilogrammes, pour 10,000 onces.

L'or standard est à $\frac{22}{24}$. Pour trouver la valeur des pièces d'or française il faut poser,—

20 francs 5·805 grammes.
31·1 grammes × $\frac{22}{24}$ = 3*l.* 17*s.* 10½*d.*
20 francs = 15·852 schellings.

Or.—Pièces de	100	francs	=	79·260 shillings.
,,	50	,,	=	39·630 ,,
,,	20	,,	=	15·852 ,,
,,	10	,,	=	7·926 ,,
,,	5	,,	=	3·963 ,,
**Argent.*—Pièces de	5	,,	=	46·925 pence.
,,	2	,,	=	18·770 ,,
,,	1	,,	=	9·385 ,,
,,	0·50	,,	=	4·692 ,,
,,	0·20	,,	=	1·877 ,,

Le changement de monnaies étant réel, et les anciennes monnaies disparaissant à mesure que les nouvelles monnaies circulaient, il a bien fallu s'habituer aux dénominations nouvelles.

Mais pour les poids et mesures, malgré des lois et ordonnances fréquentes, des pénalités assez fortes, après plus de soixante ans, dans presque toute la France on exprime encore les transactions en livres au lieu de kilogrammes; en arpents, journées, &c., au lieu d'hectares; les distances en lieues au lieu de kilomètres: mais tous les officiers publics sont sous des peines sévères tenus de ne se servir que des unités décimales.

No. 29.

No. 28.
France.

M. St. Hilaire.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* EMPIRE OF FRANCE.

By M. BARTHÉLEMY ST. HILAIRE.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. La monnaie de compte légale est l'argent. A la rigueur, et aux termes de la loi, on pourrait refuser un paiement en or, à moins qu'il n'eût été expressément stipulé.

Q. 2. What are the subdivisions of such money of account?——

A. L'unité de la monnaie étant le franc, il y a au-dessous, la pièce d'un demi franc en argent, d'un cinquième de franc en argent, le décime en bronze, et le demi décime ou vingtième du franc en bronze aussi, puis le cinquantième ou deux centimes, et enfin le centime, ou 100e du franc. Au-dessus du franc il y a la pièce de 2 francs et la pièce de 5 francs, en argent toutes deux. Il y a aussi des pièces de 5 francs, de 10 francs, de 20 francs, et de 40 francs en or. Chacune de toutes ces pièces a son poids, son diamètre, et son alliage fixé par la loi. Les dimensions sont rapportées au mètre, base générale de toutes les mesures.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Il n'y a que deux dénominations en usage, l'or et l'argent. Il y a aussi le cuivre ou billon, qui est une monnaie légale. Il faut une loi spéciale pour que les billets dits de la banque de France aient cours forcé. Le cours forcé de ces billets a été établi avec grand avantage en 1848.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. Le rapport des monnaies de France à celles du Royaume Uni varie constamment suivant l'offre et la demande des deux marchés. Le franc vaut en général $\frac{20}{25}$ du shilling. La pièce de 20 francs vaut $\frac{20}{25}$ d'une livre sterling. Mais c'est tantôt plus et tantôt moins.

* This is reckoning the price of English standard silver at five shillings per ounce troy.—A.S.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. Les pièces courantes sont toutes celles qu'on a indiquées plus haut. Les autres ont été successivement démonétisées.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Les pièces les plus petites en usage sont les centimes; c'est celles aussi dont on se sert dans les appoints, quoiqu'en général on donne la pièce entière de 5 centimes pour 3 centimes, et qu'on ne donne rien quand l'appoint est au-dessous de trois centimes.

Q. 7. What is the coin of lowest value in common use?——

A. Le centime est la pièce de la plus faible valeur. Parfois dans la conversation on parle de liards et même de deniers, mais il n'en existe plus.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. On trouve généralement le système commode, et dans les classes ouvrières on ne se plaint pas de recevoir des centimes; ce qui est du reste en général fort rare.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. La monnaie de compte avant celle-ci était la livre subdivisée en vingt sous. Il y avait des pièces de 15 sols, et autres dont je ne me rappelle pas très-bien l'existence. Il y avait aussi des pièces de 2 sols, de 1 sol, des liards, dont 4 pour former un sol. Il y avait des pièces de $1\frac{1}{2}$ livre, de 3 livres, de 6 livres, en argent. Des louis d'or valant 24 livres, de doubles louis valant 48 livres, et des quadruples valant 96 livres.

Q. 10. What was its legal value relatively to the present money of account?——

A. La livre valait à très-peu-près ce que vaut le franc aujourd'hui; et dans la conversation ordinaire on prend indifféremment les deux expressions; on dit également dix mille livres de rente ou dix mille francs de rente.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. Les pièces courantes étaient jadis celles qu'on vient d'indiquer, et leur rapport est facile à tirer des indications précédentes.

Change of Money.

Q. 12. When did the change take place?——

A. Le changement a été commencé par la Convention Nationale en 1793, et après bien des transitions il n'a guère été achevé que vers 1845, après plus d'un demi-siècle. Tout récemment encore il a subi quelques modifications de peu d'importance.

Q. 13. What was the cause of the change?——

A. Le système était peu commode en lui-même, mais c'est surtout la bigarrure de province à province qui a décidé le changement. En voulant réduire le pays à l'uniformité, on a été poussé à examiner de plus près les bases du système et à les changer absolument.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. L'ancien système avait des inconvénients, mais c'est surtout par des causes politiques qu'on a été amené à le remplacer.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. L'ancien système n'étant pas décimal offrait des divergences profondes avec le système de numération, et par suite causait des difficultés dans les comptes; il fallait faire des opérations assez complexes et assez difficiles, parceque le système était duodécimal dans certaines parties, vicésimal ou décimal dans d'autres.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money, or in account keeping?——

A. Ces inconvénients, tout réels qu'ils étaient, auraient été supportés très-longtemps encore sans les causes supérieures qui firent bouleverser et reconstruire, de fond en comble, toute la société.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. C'était surtout les classes ouvrières qui sentaient les inconvénients. Plus haut on en sentait moins la gêne, parcequ'on était plus éclairé.

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Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its either as a money of account or of exchange before it was established by law?——

A. Il n'y eut aucun désir d'imitation en France ; on prétendit, au contraire, donner l'exemple au monde entier ; et, au fond, on n'avait pas tout-à-fait tort ; malgré les excès de la vanité nationale, on était seul dans le vrai.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. La préférence était indiquée et justifiée par le système général de numération, qui est essentiellement décimal par la loi même de la nature qui a donné dix doigts aux mains de l'homme. Mais il y eut aussi en France une sorte de passion violente et abstraite pour l'unité en toutes choses, y compris la monnaie.

Q. 20. In what way was the change effected?——

A. Le changement a été fait par la loi, rattaché au changement général des mesures de tout ordre, et fondé sur la mesure de la terre.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. On changea plusieurs fois la valeur des monnaies courantes, en attendant que les nouvelles livres fussent substituées complétement. La pièce de 6 livres, par exemple, fut réduite à 5 francs 80 centimes ; celle de 3 livres à 2 francs 75 centimes, &c.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. On émit les nouvelles pièces en concurrence avec les anciennes, en indiquant une époque où les dernières n'auraient plus cours.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. On modifia plusieurs fois les époques où les anciennes pièces devaient cesser d'être reçues. On mit beaucoup de modération dans ces exigences successives.

Q. 24. Were any old names given to new coins or new names to old coins?——

A. Le nom de franc était en usage peu fréquent avant le changement. C'est le seul nom qu'on emprunta au passé, où d'ailleurs il n'était pas légal.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. Il n'y avait pas de rapport tout-à-fait exact entre les deux genres de monnaies, mais la livre et le franc étant très rapportés on les prit l'un pour l'autre dans la conversation, mais jamais la loi ne les confondit.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. Je ne connais pas assez le détail de ces changements pour répondre directement à cette question. Des lois transitoires ont réglé ces petites difficultés.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. Le changement a été, je crois, immédiat. Les lois de la Convention Nationale, insérées au Bulletin des Lois de ce temps, fourniront sûrement tous ces renseignements. La Convention fut en général moins dure qu'on ne le croirait d'après sa réputation.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. Les deux systèmes ont continué assez longtemps d'être simultanés. Ils sont actuellement tout-à-fait distincts, et le nouveau est seul légal.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. La simultanéité n'était qu'une tolérance. On la fit cesser le plus tôt qu'on pût.

L'histoire des assignats est très compliquée, et je n'oserais en parler ici parceque je ne la sais pas assez bien. M. Thiers en a parlé en traits généraux dans son histoire de la Révolution, mais admirablement.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. C'était à l'amiable qu'on s'entendait en s'appuyant le plus qu'on pouvait sur la loi.

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Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. Il y a diverses parties de la France,—la Bretagne, par exemple, l'Auvergne, &c.,—où l'on a conservé les anciennes façons de parler et même beaucoup de vieille monnaie.

Certaines classes ont conservé aussi certaines locutions. Les maquignons, par exemple, parlent toujours par pistoles, ou pièces de 10 livres. Dans bien des provinces on parle aussi par louis ; et à Paris même, depuis quelque-temps, cette expression est souvent appliquée aux pièces de 20 francs.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. Le changement a été surtout impopulaire parmi les classes ignorantes. Il n'y a guère que vingt ans que l'impopularité a disparu ; elle a duré plus de trente ans. Cela tenait surtout à ce que les marchands en détail trompaient les pauvres à l'ombre du changement légal.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. La monnaie actuelle est mille fois plus commode, parcequ'elle est décimale soit pour les grosses sommes, soit pour les petites, dans l'usage courant ou dans les comptes.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. En France tous les poids et mesures sont divisés décimalement, saut le temps, qui est duodécimal, sexagésimal, &c. Le système entier a été décrété à la fois, par la Convention Nationale en 1793 et 1794.

Le système monétaire tient par le mètre au reste du système des poids et mesures.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. Tout est décimal. Il ne reste que les tromperies inévitables, quand les gens ne sont pas honnêtes et parfaitement droits.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect?——

A. Toutes les lois, décrets, ordonnances, arrêtés, &c. sont insérés au Bulletin des Lois.

Il y a aussi une foule d'ouvrages où tous les détails sont consignés. Les plus récents seraient les meilleurs à consulter. Je ne pourrais point les indiquer particulièrement.

BARTHÉLEMY ST. HILAIRE,
Membre de l'Institut de France.

15 Décembre 1856.

No. 20.

SARDINIA.

No. 30. Sardinia.

Her Majesty's Minister.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* KINGDOM OF SARDINIA.

Sent by HER MAJESTY'S MINISTER at TURIN.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. The lira or franc throughout the Sardinian States.

Q. 2. What are the subdivisions of such money of account?——

A. The centime, or hundredth part of a lira.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Practically all payments and receipts are recorded in lire and centimes.

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Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The value of the lira is about 10*d.* sterling, and of the centime $\frac{1}{10}$ of a penny.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A.

Denomination.	Value in Lire and Centimes.	Value in British Currency.
Gold.		
New Coins :—	Lire. Cents.	£ s. d.
Pieces of 100 lire	100 0	4 0 0
„ 80 „	80 0	3 4 2
„ 50 „	50 0	2 0 0
„ 40 „	40 0	1 12 1
„ 20 „	20 0	0 16 0½
„ 10 „	10 0	0 8 0¼
Old Coins :—		
Doppia of Savoy	28 45	1 2 10½
Half	14 22½	0 11 5¼
Quadruple of Genoa	79 0	3 3 4
The fractions ½, ¼, ⅛ in proportion.		
Silver.		
Piece of 5 lire	5 0	0 4 2
„ 2 „	2 0	0 1 8
„ 1 „	1 0	0 0 10
„ 0·50	0 50	0 0 5
„ 0·25	0 25	0 0 2½
Mixed Metal.		
Old Coins :—		
Piece of 8 sous	0 40	0 0 4
„ 4 „	0 20	0 0 2
Copper.		
New Coins :—		
Piece of 5 cents	0 5	0 0½
„ 3 „	0 3	0 0$\frac{3}{10}$
„ 1 „	0 1	0 0$\frac{1}{10}$

In the Island of Sardinia the following coins are also legally current :—

Denomination.	Value in Lire and Cents.	Value in British Currency.
Gold.		£ s. d.
Carlino	50 lire.	2 0 0
½ carlino	25 „	1 0 0
Dopietta	10 „	0 8 4
Silver.		
Crown	4 80 cents.	0 4 0
½ crown	2 40	0 2 0
¼ crown	1 20	0 1 0
Mixed Metal.		
Reale	0 48 „	0 0 4$\frac{8}{10}$
½ reale	0 24 „	0 0 2$\frac{4}{10}$
Copper.		
Sol	0 10 „	0 0 1
½ sol	0 5 „	0 0 0½
Cagliarese	0 1 „	0 0 0$\frac{1}{10}$

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. They are amongst bakers and the lower orders generally.

Q. 7. What is the coin of lowest value in common use?——

A. The centime.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. No classes in society complain of the centime as inconveniently low or inconveniently high in value.

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Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. In the continental portion of the state the lira of Piedmont; it was subdivided into 20 sols, and the sol into 12 deniers. But in the "Novarese," the Milanese lira, equal to 0·768 of a franc or lira, is in general use as a money of account. In the island of Sardinia the money of account was the lira Sarda = 1·92 francs, subdivided into 20 sous, and the sous into 12 deniers. In Liguria, on its annexation to Sardinia in 1814, the money of account was the lira = 0·83⅓ franc, or 120 lire to 100 francs, subdivided into 20 sous, and the sous into 12 deniers.

Q. 10. What was its legal value relatively to the present money of account?——

A. 100 old lire of Piedmont (the money of account) are equal to 118¾ new lire or francs.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. None.

Change of Money.

Q. 12. When did the change take place?——

A. Practically, when Piedmont was annexed to France in 1793. In the Duchy of Genoa, however, and in the Island of Sardinia, the decimal system was not finally introduced until the years 1827 and 1843 respectively; and in the Island of Sardinia the old coins are still current at a rate fixed by law. (See Reply No. 5.)

Q. 13. What was the cause of the change?——

A. The habits contracted during the French occupation, and the evident advantage of a uniform monetary system.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. It is difficult at this distance of time to speak with confidence as to the inconveniences which may have existed; but it is obvious that the main reason for the change was the inconvenience of a return to the system which existed before the French occupation.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money, or in account keeping?——

A. Same answer.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. Same answer.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. Undoubtedly the French occupation and the constant intercourse with France had rendered the new money familiar to the public, and induced the wish to assimilate the currency of Sardinia to that of France.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. It was not.

Q. 20. In what way was the change effected?——

A. The change was finally effected by legislative enactments of the 6th and 12th August and 7th September 1816, and 4th and 9th December 1820, by which the new lira was declared to be the money of account, and all contracts were thenceforth to be made in that coin.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. They were not, except in the case of the coins of mixed metal of 20 15, and 10 sous, which were reduced in 1814 to their real value of 8 sous, 7½ sous, and 4 sous.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. In contemplation of the change the following new coins were issued, viz.:
Gold.—New doppia, 20 lire; 40 lire; 80 lire.
Silver.—Crown, 5 lire; piece of 2 lire; piece of 1 lira; piece of 0·50 lira.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. In 1826 the pieces of 7½ sols (15 sous) were withdrawn from circulation. In that year also the old lira was reduced to a new lira. with an augmentation of 18¾; that is to say, 100 old livres were to be equal to 118¾ new lire; and on the 16th of December of the same year the decimal system was introduced, and only decimal coins were permitted to circulate.

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Q. 24. Were any old names given to new coins or new names to old coins?——

A. The old coins retained their names, and the new coins received names corresponding with their French equivalents.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. They were not.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. The proportion which the old monies should bear to the new was determined by law, and all public officers were directed to conform to the tariffs accompanying that law.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. The change was so far gradual that the public had been accustomed to it from the time of the French occupation; but it became compulsory on the 18th January 1827. It was enforced by a penalty of 50 francs. It was adopted easily, except on the confines of Lombardy, where the Milanese lira is still much used; it is, however, gradually disappearing.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. The old and new system continued in use concurrently for some years; but at present, with the exception of the "Novarese," and to a certain extent Liguria, the new system is generally adopted. At Genoa the lower classes and retail dealers continue to use the old denominations, and in some instances the merchants' books are kept in double columns for the old and new money.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. No inconvenience is felt at Genoa from the concurrent use, except by merchants, who are still in some instances obliged to buy and sell in the old money, and subsequently, in their accounts, reduce it into new money.

Q. 30. Under such concurrent use how do merchants and bankers keep their accounts?——

A. Answered in No. 28.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. The change has been effectually made in most instances throughout all classes; but in a few districts of Liguria and the Novarese it has not yet been wholly accomplished.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. Like all other changes, this was somewhat unpopular amongst the lower orders at the outset; but they are gradually becoming familiar with the use of the decimal system, and all the old denominations will disappear ere long.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. The new money is undoubtedly more convenient than the old, in paying and receiving large and small sums, in keeping accounts, in large transactions and in small; sums are more easily divided, multiplied, or added up.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. They are. The decimal division of weights and measures followed the decimal division of money, but at a long interval.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. No inconvenience was found to arise from this want of conformity whilst it existed.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. This difference of division did not entail any loss upon the poorer classes as far as is known. In fact, the retail dealers found no difficulty in adapting the old weights and measures to the decimal monetary system, or, where that system was not understood by the lower orders, to the old money of account.

General Query.

No. 30. Sardinia. — Her Majesty's Minister.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect?——

A. The documents annexed to this report are:

1st. A paper of answers prepared by the Sardinian Government.

2d. A comparative table of the monies of the Sardinian states and of France, accompanied by remarks.

3d. An enumeration of the Laws and Acts passed since 1814 on the subject on the Sardinian continent, accompanied by a sketch of those in force prior to that period; and likewise by a statement of the laws peculiar to the Island of Sardinia.

4th. A paper drawn up by M. Despine, a gentleman of great authority on such matters.

The Sardinian Government are not yet in a condition to supply the whole collection of laws and other documents required; but they will be forwarded as soon as they can be got together.

No. 31.

No. 31. Sardinia. — Sig. Cattaneo.

RISPOSTE ai Quesiti della Britannica Commissione delle Monete Decimali.

Ministero delle Finanze.

L'Amministrazione Centrale delle Reale Zecche a Torino porge su' quesiti a rincontro le seguenti risposte.

Presente Moneta di Conto.

Q. 1°. Qual è la moneta di conto presentemente stabilita dalla legge?——

R. L'attual moneta di conto è la stessa che l'effettiva metallica giusta il vigente decimal sistema; cioè la lira di Piemonte, pari al franco, ossia lira di Francia.

Q. 2°. Quali sono le suddivisioni di tal moneta di conto?——

R. La lira, tanto moneta di conto, quanto effettiva, suddividesi in centesimi cento.

Q. 3°. Sonvi più di due denominazioni di moneta di conto praticamente usate nello esprimere o notare pagamenti o ricevuti, e quali sono codeste denominazioni?——

R. Legalmente sola evvi e sola praticasi l'anzidetta denominazione di lire, e di centesimi; salvo pe' rari casi eccezionali, che si avesse bisogno di far menzione dell' antica moneta di Piemonte, Genova, o Sardegna, od altra straniera non-decimale.

Presenti Monete in Corso (cioè, Moneta di Cambio).

Q. 4°. Quali sono le monete in corso legale ed in generale circolazione, e qual è il loro rispettivo valore nella moneta di conto?——

R. La moneta di cambio, ossia effettiva metallica, in corso legale,—

Pe' Reali Stati di terraferma,—

Consta delle specie d'oro, d'argento, d'erosomisto (billon), e di rame, indicate nella vigente tariffa 26 Ottobre 1826; suddividentisi in nazionali e straniere, decimali e non-decimali; aventi il legale o nominal valore ivi espresso in lire e centesimi, anchè per le specie non-decimali; al qual valore e governo e privati son tenuti a riceverle da qualsiasi debitore; purchè non liscie, nè altrimenti guaste, nè calanti in peso oltre la legal tolleranza ivi statuita, e, quanto al viglione ed al rame, fra i limiti dalla legge prefissi.

Furono però, nell' intervallo trascorso dalla emanazion della tariffa, aboliti, fra le antiche specie nazionali in rame, il due soldi, il due danari, ed in erosomisto il così detto soldino, il mezzo soldo, cioè pezzo da sei danari, e tutt' e sei le specie di Genova.

Si tolsero inoltre dal legal corso, quanto alle specie straniere, in oro, il luigi e il doppio luigi di Francia; in argento il vecchio scudo di Milano, gli scuti e spezzati del già Regno d'Italia, il vecchio scudo ed il venticinque centesimi di Francia, il vecchio scudo di Piemonte, quel di Genova, e gli spezzati loro.

E vi si aggiunsero, in ispecie nazionali d'oro, i pezzi da L. 10, da L. 50, e da L. 100, la seconda e la terza in sostituzione di quelle da L. 40, e da L. 80, rimaste sibbene in legal corso, ma da più non coniarsene.

Per l'Isola di Sardegna,—

Consta delle specie d'oro, d'argento, d'erosomisto, e di rame, inscritte nella vigente sua tariffa 26 Novembre 1842; delle cui suddivisioni, e legale o nominal valore obbligatorio, è a dire il medesimo che additossi circa le specie tariffate pe' Reali Stati di terraferma.

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Egli è però da osservare,—

Che, mentre le specie descritte nella tabella No. 1. della tariffa Sarda, non hanno legal corso ne' Reali Stati continentali, le tabelle No. 2. e No. 3. comprendono tutte le specie incluse nella tariffa per terraferma.

Eccettuate quelle in erosomisto, quelle in rame sì antico sì decimale, in argento il pezzo decimale da centesimi 25, il vecchio scudo di Genova, e gli spezzati d'esso, lo scuto e gli spezzati del già Regno d'Italia, ed in oro li multipli dell' antica doppia di Savoja.

Ed aggiuntevi all' opposto, in oro straniero, la ghinea.

Che le specie toltesi poscia di corso quanto a terraferma, come sopra si disse, il furon pur ad un tempo per la Sardegna.

E che il legale o nominal valore dalla tariffa assegnato alle specie Sarde, costituentivi la tabella No. 1., è, più o meno, superiore all' effettivo loro valor monetario (materia e opera) a cui trovasi nella tariffa medesima precisamente pareggiato il valor nominale di tutte le altre specie.

E solo è da eccettuare il cagliarese, tariffato per 1 centesimo, che in effettivo monetario valor come sovra monta a quasi $\frac{1}{8}$ di più che il centesimo di Piemonte, e ad oltre il doppio di quel di Sardegna.

Q. 5°. Sono le monete rappresentanti le più basse denominazioni della moneta di conto in suo comune ?——

Q. 6°. Qual è la moneta del più basso valore in uso comune ?——

R. Le tre specie in rame, da centesimi 1, due decimali denominate centesimo, e l'antica, detta cagliarese, sono le infime, ed in uso comune.

Q. 7°. Sono le più basse monete in uso comune lamentate come troppo alte o troppo basse in valore da qualche e da quale classe della società ?——

R. Niun richiamo da niuna classe.

Antiche Monete di Conto, e Correnti.

Q. 8°. Qual era la moneta di conto prima dell' introduzione del presente sistema? Quali erano le sue suddivisioni ?——

R. L'antica lira di Piemonte, l'antica lira Genovese, e l'antica lira Sarda, suddividentisi tutte e tre in soldi 20, ed il soldo in danari 12.

Q. 9°. Quale era il suo valore legale relativamente alla presente moneta di conto?——

R. Legalmente equivaleano, nell' attuale decimal moneta, la Piemontese a L. 1·18·75; la Sarda a L. 1·92; e la Genovese a L. 0·83·333 ossíano centesimi, $83\frac{1}{3}$.

Q. 10°. Quali monete erano in corso, e di quale valore, nell' antica moneta di conto ?——

R. Quanto a moneta effettiva, le antiche specie in legal corso erano le stesse che quelle in corso attualmente, e quali trovansi nelle ricordate tariffe.

Alle medesime però hannosi da aggiugnere le specie posteriormente abolite, o toltesi dalla legal circolazione, come già a suo luogo additossi; ed alcune cattive monete d'Allemagna provvisoriamente ricevute (onde breve durarono) per triste necessità di guerra; ed inoltre, per la Sardegna, in rame, il mezzo cagliarese, ch' era il danaro Sardo, specie non più compresasi nella tariffa in vigore; e pel Piemonte, in erosomisto, le due specie denominate quinzone e sett' e mezzo, perchè il nominal valore, lor prefisso nella emissione, fu di soldi antichi quindici, pari all' ottavo del vecchio scudo in argento, e di soldi sette e danari sei rispettivamente, corrispondenti perciò in decimal moneta a L. 0·89·0625, ed a L. 0·44·53125; di cui la 1ª fu tra breve abolita, e la 2da ridotta sotto il Governo Francese a L. 0·37·5, venne pure slegalizzata, col richiamo del coniato in zecca, poco prima ch' emanasse la vigente tariffa del 1826.

Qual si fosse l'antica moneta di conto in Sardegna, quale in Liguria, e quale in Piemonte (vale a dire in tutti gli altri Reali Stati di terraferma, compresevi perciò anche la Savoja, e la contea di Nizza) già disopra si è detto. Or siffatta moneta era meramente di conto, cioè diversa dalla moneta effettiva in ispecie metalliche; salvo, pel Piemonte, quanto al soldo e (per breve tempo) alla lira, ridotta poscia a centesimi 40; pel Genovesato, quanto alla lira; e per la Sardegna, quanto al soldo, e al danaro ch' era il mezzo cagliarese sovra indicato.

E ciascuna d'esse antiche specie avea nella rispettiva moneta di conto un legale ossía nominal valore, pari allo attuale in decimal moneta aumentato, quanto alle specie Liguri, nella ragione di 5 : 6, e diminuito, rispetto alle Sarde, ed alle Piemontesi, nella ragion di 48 : 25, e di 19 : 16; i quali ragguagli fra le antiche e la nuova moneta sono in massima precisi; se non che talvolta, nel tariffare decimalmente le vecchie monete li peculiari motivi, che in seguito si additeranno, recarono ad estimarle un po' di meno. A meglio però chiarir la cosa, ed a esattamente indicar tal valore per le specie che in maggior uso erano, si vegga il seguente specchio comprendente le nazionali; salvo per le straniere il riandar la tariffe anteriori alle sopra citate; e di più avvertendo, circa le monete straniere non-decimali, essere generale e costante regola il non ammetterle nella tariffa, fuorchè al solo effettivo lor valore in materia.

Specie Antiche Nazionali.

sdizione.	Materia.	Denominazione.	Valor nominale in Moneta. Nuova.	Valor nominale in Moneta. Antica.	Annotazioni.
			Li. Cent.	Li. Sol. Da.	
NTE -	Oro - -	Carlino - - - -	142 25	120 0 0	Comuni alle Tre Sorte di Monete.
		Mezzo carlino - -	71 12·5	60 0 0	Le più o men tenui differenze ne' decimali valori delle singole specie fra li tariffati e quelli cui dovrebbono rilevare secondo le accennate ragioni di ragguaglio, generalmente provengono dall' aversi nel tariffarli avuto in especial conto il titolo e il peso attuale in media effettiva anzichè in tassa legale, quanto all' oro e all' argento; e dal volere schivar le frazioni. Tali differenze (fuor che pel due danari di Piemonte, pel soldo e mezzo soldo Sardi), son tutte in meno.
		Doppia - - -	28 45	24 0 0	
		Spezzati, cioè metà, e quarto.	A proporzione.		
	Argento -	Scudo - - -	7 10	6 0 0	
		Spezzati, cioè metà, quarto, e ottavo.	A proporzione.		
					Speciali.
	Erosomisto (billon).	Quinzone - - -	0 7·5	0 15 0	*Moneta di Piemonte.*
		Sett' e mezzo - -	0 37·5	0 7 6	L'antico nominal valore del sett' e mezzo e del du' e mezzo corrispondea, in nuovo ossia decimal valor nominale, a quasi centesimi 45, e centesimi 15; ma durante l'occupazione Francese fu ridotto a centesimi 37½ e 12½ rispettivamente; e tal si rimase il 1° fino all' abolizion della specie nel 1826, ed è tuttora il secondo in legal corso.
		Otto soldi - -	0 40	1 0 0	
		Quattro soldi - -	0 20	0 10 0	Lo stesso è a dire dell' otto soldi, del quattro soldi, e del soldo maurizio, che pure in legal corso rimasero, e da L. 1·18·75, da centesimi 59·37·5, e da centesimi 29·6875, equivalenti a L. 1, a soldi 10, e a soldi 5 (cui per calamità de' tempi si emisero) vennero come sovra ridotti a centesimi 40, 20, e 5, rispettivamente.
		Du' e mezzo - -	0 12·5	0 2 6	
		Soldo, detto soldino -	0 05	0 1 0	
		Mezzo soldo - -	0 02·5	0 0 6	
	Bronzo -	Due soldi, detto soldone	0 10	0 2 0	E così pure il soldone, il soldino, ed il mezzo soldo, che nominalmente valuto avrebbono quasi centesimi 12, 6, e 3, furono rispettivamente ridotti a centesimi 10, 5, e 2½.
	Rame -	Soldo, detto maurizio -	0 05	0 5 0	
		Due danari - -	0 01	0 0 2	
DEGNA -	Oro - -	Carlino - - - -	50 0	26 5 0	*Moneta di Sardegna.*
		Mezzo carlino -	25 0	13 2 6	Alle picciole differenze in nominale decimal valore delle tre specie in oro, tra 'l tariffato ed il risultante dall' esatto ragguaglio della lira decimale coll' antica Sarda, fu motivo il volersi tal valore assegnato in cifra rotonda, e fors' anche il troppo divario in più, che altrimente sarebbevi stato, tra 'l valor reale ed il nominale in L. 1·08 pel carlino, e a proporzione per gli altri 2 pezzi.
		Doppietta - -	10 0	5 5 0	
	Argento -	Scudo - - - -	4 80	2 10 0	
		Spezzati, cioè metà, e quarto.	A proporzione.		
	Erosomisto	Reale - - -	0 48	0 5 0	Le ultime 4 specie, a preciso ragguaglio, corrisponderebbero, in nominal valore decimale, a centesimi 9·6, a 4·8, a 1·6, ed a 0·8. Ma nella tariffa si apprezzarono, per rotondità di cifra, le prime due a centesimi 10, e a 5; si tolse l'ultima, fra altri motivi, per la somma esiguità di valore; e la 3ª si tassò ad un solo centesimo, perchè dovendosi di necessità scegliere fra tal quota, e l'altra di centesimi 2, reputossi conveniente il preferir la minore, siccome agguagliante all'incirca l' intrinseco valor della specie in opera e materia.
		Mezzo reale - -	0 24	0 2 6	
		Soldo - -	0 10	0 1 0	
	Rame -	Mezzo soldo, o tre cagliaresi.	0 05	0 0 6	
		Cagliarese - -	0 01	0 0 2	
		Mezzo cagliarese -	0 00·5	0 0 1	
NOVESATO -	Oro - -	Quadruplo - - -	79 0	96 0 0	
		Spezzati, cioè metà, quarto, e ottavo.	A proporzione.		
	Argento -	Scudo - - - -	6 56	8 0 0	*Moneta di Genova.*
		Spezzati, cioè metà, quarto, ottavo (ch' è la lira), e sedicesimo.	A proporzione.		La più o men lieve discrepanza che presenta il nominale decimal valore di ciascuna specie, a rincontro, relativamente a quanto riuscir dovrebbe a giusta ragion di ragguaglio fra l'antica moneta Genovese, e la nuova decimale, è imputabile senz' altro alle trascurate frazioni, e massimamente alla differenza in meno tra la presumibil media degli effettivi titolo ed attual peso, ed il peso e titolo legali.
	Erosomisto	Quattro soldi - -	0 16	0 4 0	
		Due soldi - -	0 08	0 2 0	
		Parpajola doppia, ossia cavallotto - -	0 10	0 2 8	
		Parpajola - -	0 05	0 1 4	
		Otto danari - -	0 02	0 0 8	
		Quattro danari -	0 01	0 0 4	

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Cambiamenti di Monete.

Q. 11°. Quando ebbe luogo il cambiamento ?——

R. Molte furono, come in generale per tutti gli altri stati, le vicissitudini cui, secondo circostanze, andò la moneta soggetta ne' paesi ora spettanti alla Sabauda Monarchia, tanto al di là dell' Alpi, quanto in Italia, e nel Mediterraneo. Ed il partitamente annoverarle da' primordi in fino ad ora, o sol anche da quando nel cominciar del secolo XI, al caduto Regno di Borgogna, succedea fra le altre la signoria di Savoja, riuscirebbe lavoro di tal momento da esigere più volumi, gravissime indagini, tempo lunghissimo, e dovizia di modi e d'agi da tanto; alla qual impresa però già attesero alcuni fra gli illustri scienziati, specialmente il Cavaliere Domenico Promis, nella preziosa opera sua delle Monete de' Reali di Savoja, stampata in Torino co' tipi del Chirio e Mina nel 1841, illustrata con rami, e descrivente quanto in siffatta materia li principi nostri per li vari stati, cui vennero di mano in mano acquistando, provvidero ed operarono nei 7 secoli addietro, e sino al 40° anno del corrente decimonono; lavoro questo per altra parte, che non par richiesto da' quesiti cui si risponde, che per quanto sembra tornerebb' estraneo ed inutile a' probabili fini de' quesiti medesimi, e per cui ad ogni modo agevol sarebbe il ricorrere all' opera citata.

Per la qual cosa le presenti risposte riferisconsi unicamente alla nuova monetazion vigente, ed all' ultima delle antiche, a quella cioè che vi avea, quando l'augusta Sabauda Casa nel Maggio del 1814 rientrò nel possesso degli aviti stati di terraferma, cui s'aggiunse il Genovesato, conformemente a'trattati di Parigi e di Vienna.

Or la surrogazione dell' uno all' altro monetario sistema incominciò per terraferma nel 1816, che da Real Provvigione del 6 Agosto di quell' anno (mandata eseguirsi con Cameral Manifesto del 12 stesso mese) sostituendosi la nuova decimal moneta di conto all' antica, s'instituirono, quanto alla corrispondente moneta effettiva, le precipue due specie, in oro da L. 20 denominata doppia, ed in argento da L. 5 chiamata scudo, vocaboli già usati nella monetazione antica. Progredì poscia coll' istabilirsi in altra Real Provvigione del 4 Dicembre 1820, li due primi multipli del pezzo da L. 20, e li tre maggiori spezzati dello scudo. E dopo emanata in principio del 1826 una nuova general tariffa, comprendente (al precipuo fine di tassarne il valore in decimal moneta) tutte indistintamente le specie in legal corso, si recò, per Realo Editto del 26 Ottobre d'esso anno,* a pien compimento in diritto, e nella pratica attuazione vieppiù avanzossi. Pichè da tal legge tutta rifusasi la general tariffa, con qualche correzion nelle tasse dell' antiche specie, vennero alle decimali già introdottesi aggiunti l'infimo spezzato dello scudo, e le tre in rame da centesimi 5, da 3, e da 1; le antiche in erosomisto ed in rame, sian di Piemonte sian del ducato di Genova, furono a legal corso ammesse cumulativamente in entrambe esse parti dello stato, ma ciò in via soltanto provvisoria (mentre vi si espresse la intenzione e riserva di poscia ritirarle) e colla debita limitazione a proporzional quota ne' singoli pagamenti: oltrechè tutte vi si fermarono le basi della nuova monetazione in conformità con quelle statuite nel regno di Francia. Il qual sistema, ne' modi e limiti che già si dissero, fu poi dal 1° Gennajo 1843, esteso all' Isola di Sardegna per Realo Editto, e per la citata annessavi general tariffa, del 12 Novembre 1842.

Q. 12°. Qual fu la causa del cambiamento ?——

R. Cagione estrinseca e accidentale si fu l'abitudine da' cittadini contratta, durante la signoría Francese, di computare e pagar in franchi e centesimi; donde avveniva che, sebben legalmente ricangiata dal 21 Maggio 1814 la Francese decimal moneta nell' antica nazionale, continuassero tutti a contrattar nella decimale; o pienamente, o per lo meno, ritenuti soltanto i vocaboli di lira, e di soldo, conteggiarli siccome pari l'uno a centesimi 5, e l'altra ad 1 franco. Il che però vuolsi detto non per Sardegna alla nimica invasione sottrattasi, ma per terraferma; e vieppiù pel Piemonte, che per la Liguria, ove tuttor frequente ne' volgari usi rimane l'antica moneta di conto in lire, e soldi, e, strano a dire, centesimi (a luogo di danari) fuori banco, abusivamente ragguagliando il centesimo a danari 3, li 4 centesimi al soldo, e gli 80 alla lira, quando in realtà la lira è centesimi $83\frac{1}{3}$, il soldo $4\frac{1}{6}$, ed il danaro $\frac{2}{7}\frac{5}{2}$ di centesimo, siachè 3 danari equivalgono a centesimi $1\frac{1}{2}\frac{1}{4}$.

Anzi, per ciò che al Piemonte concerne, vuolsi a compiuta nozione della costumanza soggiugnere, che primamente, benchè a non lungo intervallo e fino all' emanar dell' analoga dichiarazion legislativa, praticossi per le due monete antica e nuova, in luogo della giusta ragione di 16 : 19, quella erronea, ma più spiccia e più comoda, di 5 : 6. E per ciò che alla Sardegna riguarda, la non mai precedentemente interrottavi osservanza dell' antico sistema, la maggiormente indugiatavi sostituzione del nuovo, e, fra varie

* Promulgato il 4 successivo Febbrajo.

altre cause, il non essersi colà per anco ritirate nè pur le minime fra le antiche specie, ned emessene altre decimali fuorchè in rame, come meglio in seguito si dirà, guari finor non permisero, che la pratica attuazione della nuova moneta di conto dagli atti ed ufici del Governo, e dalle commerciali operazioni, si diffondesse e si connaturasse eziandío a' minuti traffici, alle private giornaliere transazioni, e a' popolari costumi.

Che se l'addottasi cagione accidentale ed estrinseca, pel Piemonte in ispecie, e così per la massima parte dello stato, spinger potè il Realo Governo a modificare in dritto il monetario ordinamento, acciocchè più non fosse in contraddizione col fatto: ben altre maggiori cause ve n'ebbero, a tutto lo stato comuni, permanenti, ed alla cosa intrinseche ed essenziali.

Da lunghi anni li finitimi stati di Lombardia (per le specie del Regno Italico,) di Parma e Piacenza, e massimamente di Francia, colla quale è il più delle nostre internazionali relazioni di commercio, costituito aveano a decimal forma il monetario sistema; il quale, fattavi diuturna e buona prova, lasciava presagio, or forse non lontano dall' avverarsi, che più o men tardi a pari mutamento procederebbero le altre Genti Europee, anteponendo alla vaghezza, al vanto, o, se pur vogliasi, al qualche benefizio d'aversi ciascun popolo una monetazione peculiarmente propria ed esclusiva, eziandío pel titolo, pel peso, e per la graduazion delle specie, li positivi ed assai più importanti vantaggi, che la decimale appresenta.

In siffatta condizion di cose dovette la Sabauda Corona avvertire all' isolamento dai suddetti stati, nel quale serbando il vecchio modo sarebbesi rimasta, senza punto avvantaggiare rispetto alle altre nazioni, ritenenti l'antica bensì, ma pur diversa loro moneta; a' danni del men facile ricevimento delle specie nostre nelle contrattazioni co' menzionati paesi conterminanti; al disagio delle conversioni dall' una nell' altra guisa di moneta di conto; all convenienza di limitazion della materia all' oro meglio appurandolo dal commistogli argento, all' argento meglio sceverandolo dal frammistovi oro, e, pel mero bisogno de' menomissimi cambi, de' resti, e de' saldi, al rame, proscrivendo l'erosomisto siccome a indebiti lucri allettante, ed in ogni modo a' falsamenti agevolissimo; al dovere il legale o nominal valore di ciascuna specie non eccedere il real valore della materia ed opera; ed a' benefici, per questo ramo di servizio come in ogni altro, dell' unità di principi per cui nella monetazione al computo misto di vigesimale, e duodecimale, si sostituirebbe il decimale; a titoli vari in ragion di metalli e di specie, un solo e medesimo titolo, e questo assegnato verso il punto, in cui la necessaria durezza per resistere agli attriti conciliasi colla maggiore possibil finezza, malleabilità, ed appariscenza; alle quote d'essi titoli, in numeri complessi, e giusta metallo diversi, una quota dell' unico titolo, in semplice numero; alle quote de' pesi in numeri egualmente complessi, altre in simplici, e questi anzi rotondi quanto all' argento, ch' è appo noi, in Francia, e quasi ovunque, il principale dei due monetari campioni, come pur quanto al rame; ed in fine a parecchie fra lor diverse graduazioni nel valore delle singole specie, in somma talor complessa, progredenti in molte ned appien adeguate ragioni, una graduazion sola, in semplici somme, e progredente in assai men ragioni, e meglio fra loro analoghe. Li quali mutamenti producendo, per tutt' i conteggi e le operazioni attinenti a moneta sì nel lavorarla, sì nell' usarne, e per ciò che al Governo ed alle finanze concerne, e per quanto al pubblico ed a' privati riguarda, l'uniformità, e la maggiore possibile semplicità, chiarezza, e facilità, gioverebber di molto a scemare i rischi ed i casi d'errori, ed anco di frodi a danno de'meno instrutti od esperti, ma precipuamente e sempre a notevol risparmio di tempo, che al più degli uomini è danaro, e per tutti è preziosissima cosa.

I lunghi studi però, le molte cure, e le spese gravissime, cui richiedeva il passare dall' antico al nuovo sistema, tanto a bene ed ordinatamente organizarlo quanto e più ancora a porlo in esecuzione, resero necessari gl' indugi a compierne l'ordinamento ed in maggior parte attuarlo per terraferma, insino al chiudersi del 1826; ed infino allo scadere del 1842, per prescriverlo, e, nella già dettasi porzione, effettuarlo, quanto all' Isola di Sardegna, reame separato dai Reali Stati Continentali fino al 1848.

Nè l'ingente dispendio, che tuttavia ci si vorrebbe, ha infino ad ora permesso il por mano ad integralmente, e per tutto lo stato, condurre ad effetto la nuova instituzion monetaria nella notevole parte che ancor le manca; il ritirar cioè, ed in ispecie decimali, a' prefissi valori, titolo, pesi ed impronte, riconiare tutte le antiche in oro di Piemonte, di Genova, e di Sardegna, in argento di quest' ultima, in erosomisto ed in rame sì d'essa che di Piemonte, ed anche il nuovo eroso della mentovata Isola, perchè non sol di tipi diverso, ma di peso per metà inferiore al nuovo di terraferma; fra le quali operazioni è certo la più urgente e costosa quella dell' erosomisto, perchè il più logoro, ed inoltre disforme per natura da' principi che reggono la moneta, tariffato a soverchio valor nominale, ed inscritto di valor diverso e molto superiore al tariffato stesso.

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Q. 13°. Fu desso cagionato da inconveniente, confusione, ovvero complessità [complexity] nello stato della moneta precedentemente in corso?——

R. Risponde su questo il già detto a' NN. precedenti, e specialmente intorno all' ultimo; ned altro evvi ad arrogere, se non se (a modo di semplice svolgimento) ch' eravi ne' Reali Stati, considerandoli nello insieme, la complessità o confusione inerente al sussistervi tre diverse monete di conto; il difetto d'analogía sì nelle corrispondentivi specie delle quattro metalliche serie, fra l'una e l'altra d'esse tre monete di conto, sì fra le specie medesime spettanti alla moneta di Piemonte; dacchè non solamente superfluo e piccolo di troppo sembra il quarto di doppia in oro, del valor medesimo c' era lo scudo in argento (specie questa però che, sebbene in legal corso tuttora, può dirsi da molt' anni scomparsa dalla circolazione), ma al penultimo nostro ben coordinato sistema l'infelicità de' tempi, in sullo scorcio del passato secolo, aggiugner facea in crosomisto, e ad eccessivo nominal valore, le specie 1° del quinzone da soldi 15, valor dell' ottavo di scudo in argento, moneta però che assai poco in corso rimase, come a suo luogo accennossi; 2° della lira da soldi 20; 3° della mezza lira, ossía del dieci soldi; nominali valori talmente soverchianti i reali, che, dopo ridottili a soli otto soldi, e quattro (or quaranta e venti centesimi), ne restarono per anco inferiori di circa $\frac{1}{5}$; 4° del cinque soldi detto maurizo, emesso per $\frac{1}{4}$ di lira, mentre, ridotto in seguito come fu a centesimi 5, superò ancora il reale di circa metà; colle quali riduzioni poi se fu rimediato a gran parte del danno in valore, emersene l'inconveniente d'avere, per la 2ª, la 3ª, e la 4ª d'esse monete, disordinata la classe delle minori specie, col venire a concorrervi l'otto soldi col sette soldi e mezzo, il quattro soldi col du' e mezzo, ed il cinque soldi, che prima di sua riduzione non valea in realtà la trentesima parte del quattro soldi (allor mezza lira) trovossi, dopo ridotto a soldi 1, concorrere col soldino, ch' era miglior moneta pur esso.

Q. 14°. Eranvi forse in tal moneta degl' inconvenienti inerenti al valore delle unità principali, o subordinate, ovvero nelle loro proporzioni l'una coll' altra? ——

Q. 15°. Erano gl' inconvenienti (se pur ve n'erano) che necessitarono o promossero il cambio, inconvenienti provati nel pagare o ricevere danaro, oppure nel tenere li conti?——.

Q. 16°. Se cotali inconvenienti esistevano, da quali classi della società erano essi precipuamente sentiti?——

R. Vi é soddisfatto pel già risposto a' precedenti numeri, ed in ispecie al 12° e 13°; donde pur si rileva, che degli spiegati inconvenienti, altri erano generali e toccanti al complesso del sistema, altri peculiari a proporzioni ed a valori in alcune serie, od in alcune specie d'effettiva moneta, od altrimente; che i primi direttamente colpivano quanto a moneta si attenga, ed i secondi più o meno sfavorevole influenza vi esercitavano; che tutti perciò rispettivamente provavansi e ne' conti da fare e da rendere, e nell' esazioni e pagamenti; ch' essendo e corso e valori, giusta la legge, comuni all' Erario e a' privati, senza distinzion di contrattazioni, di crediti, e debiti, di lor cause, o di classi o qualità di persone, tutti, proporzionatamente all' entità di lor pecuniarie operazioni, n'erano per ugual modo affetti; tranne le differenze che, nel comprenderne per nulla, per poco o molto, o pel tutto, le origini, le conseguenze anco rimote, ed il come recarvi riparo, necessariamente poneano l'ignoranza, od il sapere e la esperienza, o la poca o niuna pratica, in siffatta materia, secondo classi e professioni, secondo individui, e secondo paesi, e costumanze.

Q. 17°. Fu il cambio cagionato, in qualche ed in quale distesa [extent] da un desiderio di assimilare la moneta corrente a quella de' paesi vicini? e se così, era stata la nuova moneta resa famigliare dal suo uso, sia come moneta di conto o di cambio, prima che fosse stabilita per legge?——

Q. 18°. Fu il cambiamento cagionato, in qualche ed in qua e distesa, da una preferenza astratta per una divisione decimale di moneta sopra una divisione non-decimale?——

Q. 19°. In qual guisa venne effettuato il cambiamento?——

R. Il cambiamento ordinossi, non in un solo, ma in tutti li tre scompartimenti de' Reali Stati (il come, il quando, ed il precedentene volgare uso già si spiegarono); e non già pel fatal vezzo, d imitar gli stranieri, senza ponderare se l'altrui metodo sia buono in sè o relativamente alle circostanze altrui, nè solo in teoria ed astrattamente, ma in pratica, se fra le altrui e le nostre circostanze abbiavi parità, e se, sommati e fra lor comparati li vantaggi e svantaggi dell' altrui, e del nostro, quello a questo in bene prevalga; ma bensì, dopo accuratamente adoprate le cautele anzidette, e pel saggio consiglio di preferire l'altrui modo al nostro, quando da lunga esperienza per anche risulta per noi certamente e notevolmente migliore.

Q. 20°. Furono li valori relativi di alcuna delle monete previamente in corso cambiati?——

R. Per tutte le antiche specie, colla general tariffa emanata nell' introdursi del nuovo sistema, e già dianzi, ma isolatamente ora per le une, or per le altre, con tariffe parziali, si convertirono i legali o nominali valori dall' antica nella nuova decimal moneta; il cui provvisorio uso fe' il Governo precedere da parte delle pubbliche amministrazioni.

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Oltre poi a questa general conversione i valori di non poche fra le antiche specie andarono in esse tariffe soggetti a que' tenui aumenti o diminuzioni, che gli avuti ulteriori lumi, a seguito principalmente di nuovi e ripetuti saggi, dimostrarono bisognare stante un men giusto e preciso apprezzamento nelle tariffe anteriori, ossía che qualche sbaglio od inesattezza fossevi trascorsa, ossiache scoperto si fosse nell' effettiva media di titolo, e di attual peso un qualche abuso nel coniamento, od un maggior logorío, non esigenti però la esclusion dalla tariffa.

Q. 21°. Fu qualche e quale nuova moneta coniata prima ed in contemplazione di, simultaneamente con, ovvero dopo il cambiamente ?——

R. Delle monete decimali instituitesi prima del general riordinamento, dell' altre contemporaneamente al medesimo, anzi per esso introdotte al fine di compierlo, e delle posteriormente aggiuntevi (il che fecesi nel 1832, per Reali Patenti del 29 di Maggio), già si diede ragguaglio nel No. 4.

Q. 22°. Fu qualcheduna e quale delle previe monete tolta di circolazione ; e fu qualcuna e quale delle antiche monete permessa di circolare simultaneamente alla nuova ?——

R. Tutte le antiche specie, tanto nazionali quanto straniere, già ammesse nel precedente sistema, rimasero pel nuovo in legal corso, insiem colle decimali; tranne, in erosomisto, il quindici soldi, ed il poco dianzi abolito sett' e mezzo; in rame, il mezzo cagliarese; ed alcune monete d'Allemagna a bassa lega.

Alle quali abolizioni, altre se n'aggiunsero posteriori al monetario riordinamento, ed in più tempi (vale a dir pe' Camerali Manifesti de' 26 Marzo, 31 Ottobre, e 24 Novembre 1829, 18 Gennajo 1845, e Real Decreto 8 Agosto 1852). Il tutto come già particolareggiossi a' NN. 4, 10, ed 11.

Q. 23°. Furono dati dei vecchi nomi alle monete novelle, ovvero nomi nuovi alle monete antiche ?——

R. Per le antiche specie non variarono i nomi; ma soltanto i valori, pesi, titoli, &c., convertironsi dal nazional computo antico nel nuovo decimale, od anco in entrambi si prefissero.

Alla nuova moneta poi saggiamente si diedero gli antichi nomi, in quanto fu possibile senza detrarre alla decimal forma del nuovo sistema, chiamando lira l'unità-base, tanto di conto quanto effettiva in una specie d'argento, pari assolutamente ed in tutto al Franco; alle due precipue spezie, in oro l'una, in argento l'altra, serbaronsi li nomi di doppia, e di scudo; doppia eziandío (men acconciamente) e quadruplo si denominarono li due multipli in oro primamente instituiti; e pezzi o pezze detti furono gli spezzati dello scuto, e le monete in rame, vocabolo questo a tutte specie comune per volgare abitudine in Piemonte, e venuto di Francia al vernacol nostro, anzichè proprio della lingua Italiana, in cui la generica denominazion tecnica è specie, e la communale è moneta; le pezze si distinsero, specificandone ciascuna dal suo valore; e solamente si proscrissero le voci di soldi, e denari, surrogandovi quell' aritmetica di centisimi.

Siccome però con siffatte denominazioni toccato era a tre specie in oro, l'una antica, e due decimali, il nome istesso di doppia, a riparo d'ogni anomalía, le già citate Patenti del 29 Maggio 1832, che alla doppia da L. 40, e al quadruplo da 80, sostituirono le specie da 50, e da 100, e quell' aggiunsero da 10 lire, a tutt' e quattro le decimali monete d'oro estesero la generica qualificazione di pezze, già come sovra attribuita alle specie in rame, ed ai summultipli dello scudo.

Se non chè fu, ed è tuttavia nel popolar costume il non chiamar doppia la decimal moneta da L. 20, ma solamente l'antica; il dirla promiscuamente o pezza (come tutt' altra) dal valore specificandola, o napoleone o marengo, dallo institutore o dalla prima emissione in Italia, e doppio o mezzo marengo o napoleone le specie da L. 40 e da 10; il valersi a voce della denominazione non più di denari, ma sì di soldi per quanto non aggiugne a lira o lire intiere, dicendo es. gr. sedici, trenta quattro, cinquanta nove soldi, cinque lire e otto soldi, più ordinariamente che non 80 centesimi, 1 lira 70 centesimi, 2·95, e 5·40 (quale all' opposto adoprano pe' conti), e dando nel parlare il nome di dieci soldi, di cinque, e di uno alle specie da centesimi 50, da 25, e da 5, siccome quel di otto soldi, di quattro, di du' e mezzo, e di uno alle specie antiche da centisimi 40, da 20, da 12·5, e da 5, non meno che al nuovo pezzo eroso da 5 centesimi.

Il medesimo poi, e vieppiù è a dirsi pel Genovesato, e per la Sardegna; rimanendo per l'uno intera e viva la volgar consuetudine dell' antica moneta di conto, ed alla seconda mancato essendo l'avvezzamento al decimal sistema, ch' ebbero i Reali Stati Continentali durante il Napoleonico Impero, e l'attuazion successiva se non pel rame.

Q. 24°. Furono le antiche monete di conto, nelle più basse denominazioni, commensurabili con ed espressibili esattamente nelle nuove monete?——

R. Le tre antiche monete (sì di conto sì effettive), essendo miste di vigesimali e dodicesimali elementi, diverse inoltre dalla nuova per la entità di valore

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nell' unità-base, cioè nella lira, riescono bensì non irrazionali, avendo ciascuna la peculiar ragione colla decimale, che già si disse al No. 10.; ma sono in parte incommensurabili con essa, ed in essa non precisamente esprimibili, perchè in parte non hanno, comune alla moneta nuova, altro aliquoto che l'unità.

Nè quì farà d'uopo notare, che la condizion della esatta esprimibilità sempre incontrasi, dove sussiste la condizione della commensurabilità, e manca pur quella (salvo poche eccezioni) dove questa non trovasi.

Ma convien por mente,

Che, a stabilire, se commensurabili siano le anzidette monete nelle loro unità, e divisioni o summultipli, e generalmente nell' espressevi somme, come pur ne' valori delle analoghe specie effettive, forza è per lo più (come si adoprò ne' calcoli infra riferiti), che, previamente, ciascuna data somma in data antica moneta di conto od effettiva specie, venga, per quanto bisogni a renderla capace d'un comune aliquoto, convertita nei volgari summultipli della propria unità (soldi, ed ove d'uopo denari), od anco, se occorra, in frazionaria decimal forma, vale a dire in centesimi della stessa unità sua; e così esclusane la complessità, ed in ciò almeno fattala omologa alla nuova moneta; e questa pur, se mestieri, a centesimal espressione ridotta, procedere allor al confronto dell' una coll' altra.

Che dove fra più angusti limiti si ristringesse la conversion suddetta, ovver si escludesse del tutto, a men casi nella 1ma ipotesi, ad assai pochi nella 2da, senz' alcun proridurrebbesi la commisurabilità.

E che all' opposto, se tal conversione si estendesse a decimale espression frazionaria d'oltre 2 cifre, li casi di commensurabilità diverrebbero tanto più frequenti, quanto all' uopo crescesse il novero delle ifre di siffatta espressione; novero che aumentar potrebbesi a cotal fine, fuori e sin dove sorgesse l'ostacolo della periodicità. A tanto però sospinti non furono i calcoli di commensurabilità nella presente contenuti; poichè questo riuscendo a mera curiosità e teorica speculazione, anzichè a qualche positiva utilità, parve cosa estranea al quesito: siccom' estranea vi è la precisa esprimibilita meramente teorica; la quale, innoltrar potendosi, non solo per frazion decimale fino all' ostacolo anzidetto (unica menda del decimal sistema, quanto alla matematica esattezza, scevra però da inconvenienti per ciò che a' pratici usi concerne), ma ben anco per frazion volgare al cui pienissimo sviluppo non v' ha impedimento di sorta, senza eccezione alcuna sussiste per qualsiasi valore e somma in qualsiasi specie e moneta; esprimibilità questa però praticamente inutile se non se per quanto ella conduca, ne' finali risultamenti di ciascun dato conteggio, insino ai dieci millesimi, per negligere tal frazione, ove non ecceda li millesimi 5, e per forzarla, ove li superi, all' intero centesimo, infima nel nuovo sistema tra le specie d'effettiva moneta, e sotto cui per conseguenza più non evvi possibilità di esazione o pagamento.

Considerata pertanto ne' limiti sovra spiegati la commisurabilità (e così, per essa, eziandío la esprimibilità perfetta ne' limiti medesimi), verrà ora partitamente esposto il dove sussista, o no, tal qualità, mercè la bisognevole conversione; e ciò incominciando dalle tre monete di conto, e quindi passando, in applicazione, all tre di cambio, ossiano effetive.

Incommensurabile si è la lira: salvo nella moneta Sarda; e tranne inoltre, nelle somme di 4, o suoi multipli, la Piemontese; di 3, o multipli suoi, la Genovese.

In tutt' e tre il soldo è privo di commisurabilità: fuorchè per le somme di 16 nella moneta Piemontese; di 5, e perciò anche di 10, e di 15 nella Sarda; di 6, e perciò anche di 12, e di 18 nella Genovese. E tanto più manca di tal qualità il danaro, in tutt' e tre le monete ugualmente; eccettuata soltanto, per la Sarda, la somma di 5 oppur 10.

Venendo poi da' numeri o valori semplici ai complessi, questi difettano parimente di commensurabilità, ove ne difetti come sovra anche sol una delle due o tre semplici quantità componenti.

Riescono però eccezionalmente commisurabili—

Li complessi di lire e soldi (senza denari), il cui equivalente in tutti soldi, o denari, o centesimi della propria lira, abbia per aliquoto il 6, o l' 8, secondochè trattisi della moneta di Genova, o di quella di Piemonte.

E quanto alla Sarda, tutt' indistintamente i complessi di soldi e denari (con o senza lire), ove appartengano ad alcuna delle cinque seguenti combinazioni (inclusavi per prima, quella di soldi 5, 10, o 15, con denari 5, o 10, già risultante dalla suddita general regola circa i complessi); ciascuna delle quali serba inalterata, per ciascuno de' due suoi termini, l'aritmetica progressione del 5.

Vale a dire:

1^{a}. Di soldi $\left\{\begin{matrix}5\\10\\15\end{matrix}\right\}$ con denari 5, ovvero 10.

2ª. Di soldi { 1, 6, 11, 16 } con denari 3, od 8.

3ª. Di soldi { 7, 12, 17 } con denari 1, 6, od 11.

4ª. Di soldi { 3, 8, 13, 18 } con denari 4, ovvero 9.

5ª. Di soldi { 4, 9, 14, 19 } con denari 2, ovvero 7.

Nell' effettive tre monete poi, limitando la risposta, in conformità pur del quesito, alle picciole specie, per tali considerando quelle d'un valor nominale minore della rispettiva lira, e distinguendole fra le abolite e le tuttora in corso, si osserverà, che quanto alle specie abolite :—

Di Piemonte: l'ottavo di scudo, ed il quinzone, ambi allo stesso nominal valore di soldi 15, il sett' emezzo a soldi 7 denari 6, il duesoldi detto soldone, il soldo detto soldino, il mezzosoldo (denari 6), e il duedenari furono incommensurabili colla nuova decimal moneta; e tali (fuorchè il soldone) eransi rimasti anche tariffati decimalmente, e di valore diminuiti come, e per qual motivo, a suo luogo indicossi.

Di Sardegna: il mezzo cagliarese, che vale 1 danaro, era incommisurabile parimente.

Di Genova: il sedicesimo di scudo (de valore di soldi 10), il quattrosoldi, il duesoldi, la doppia parpajola (soldi 2, denari 8), la parpajola (soldi 1, denari 4), l'ottodanari, ed il quattrodanari, tutti egualmente mancavano di commisurabilità; nè tampoco (tranne li quattro, e' due soldi, ed ambe le specie di parpajola), vennero ad acquistarla colla operatane tariffazion decimale a valor come sovra diminuito.

Quanto alle specie in corso :—

Di Piemonte : l'ottosoldi, il quattrosoldi, ed il soldo denominato maurizio che, nel primo ed originario valor nominale, la lira antica, la mezza, ed il quarto di essa, incommensurabili erano, tassati dappoi decimalmente, e ridotti a soli centesimi 40, 20, e 5, la condizione acquistarono di commensurabilità; ma il du' e mezzo, benchè trasmutato dal primordial suo valore d' $\frac{1}{6}$ di lira antica in $\frac{1}{8}$ di nuova, praticamente incommisurabile si restò, equivalendo in decimal moneta dapprima a L. 0·14·84375, e quindi a 0·12·5.

Di Sardegna : il quarto di scudo, il reale, ed il mezzoreale, del nominal valore di soldi 12 denari 6, di 5 soldi, e di soldi 2 denari 6, commisurabili riescono ; il soldo, il mezzosoldo, ed il cagliarese che punto non l'erano diventaronlo per la nuova tariffa, la quale da centesimi 9·6, centesimi 4·8, e centesimi 1·6, forzò, li due primi a centesimi 10, ed a 5, e ridusse l'ultimo a solo 1 centesimo onde fu aguaggliato alla decimal effettiva moneta di tal nome e valore.

Di Genova : non evvi minuta specie, fuori dell' abolite.

Nè quì altro rimane a soggiugnere, se non se—

Che mentre la decimal tariffazione, ed a più o men valore, avvenuta per le dette specie, tanto in corso quanto abolite, non potè dotar tutte di commensurabilità, tutte però le fornì dell' altra indispensabile condizione la precisa esprimibilità ; giacchè pur le due monete tassatesi colla frazion di mezzo centesimo, e perciò, a seconda de' posti principi, ed a rigor di sistema, prive di tal condizione ; nel debito suo senso, ch' è il pratico, non ne diffettavano correlativamente alle peculiari inveterate abitudini del paese.

E che del resto, se nel tariffare qualsivoglia specie, generalmente schivar deesi (negligendo o forzando) la frazion decimale oltre la 2ᵈᵃ cifra; se nelle nobili monete ogni maggiore arbitrio per differenza tra nominale e real valore, è, più o meno, di biasimo e danno; e se il simile vuolsi adequatamente pur dire delle men nobili (ossían miste con rame) ove infelicemente codesta sorta di monetazione già siasi introdotta, nè togliere ancor si possa ; nelle specie poi ignobili ed infime, che unicamente han da servire a'menomissimi cambi, ai saldi e resti negli altri, quali tenersi possono le monete non eccedenti li 5 centesimi ; il rigoroso pareggiamento fra li due valori più non essendo di pari necessità, ed anzi meno agevole riuscendo in pratica, ne riman luogo ad un qualche (però ben modico) sovrappiù nella tassa ; onde poi in caso di successiva conversione vi è senza inconvenienti attuabili, giusta circostanze, sì un esiguo ampliamento, sì ed assai meglio una restrizione ; de' quali due modi il secondo venne pressochè sempre trascetto nelle menzionatesi tariffe nostre; e senza

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dubbio egli è, per giustizia, siccome anche per vera utilità, miglior partito il più avvicinarsi alla uguaglianza ne' due valori, che non l'iscortarsene maggiormente, la parità essendo la regola a tutta monetazion comune, e la disparità per le ignobili specie un'eccezione: la qual dee rinserrarsi (come la quantità di coniamento, e di spendibilità obbligatoria nei limiti del necessario a'peculiari usi suoi) entro gli angusti confini di ben poco più che l'intero costo della materia e dell'opera, incluse però anche le varie spese di cui non suolsi tener conto nelle monete d'oro e d'argento; poichè una maggior disuguaglianza produce, a sua gravità proporzionato, il danno di snaturar tali specie, trasmutandole di moneta in segni non realizzabili, fuor con iscapito, a peso specialmente dell' ultime classi de' cittadini, e de' più poveri comuni (appo cui la menomezza di tutte relazioni le vien naturalmente accumulando) e vi accoppia, se non il rischio del discredito e del rifiuto, che pur talvolta ne accadde, il pericolo certamente e della contraffazione in grande, or molto agevolata da' cospicui incrementi delle fisiche scienze, e del cacciar di circolazione una parte delle buone specie, o di farle incarire, avvenendo al monetario valore in corso alcunchè di somiglievole allo irradiar del calorico fra li corpi e' lor mezzi, il quale, fino all' equilibrio, non posa.

Q. 25°. Se non esattamente espressibili, quali previsioni furon fatte per debiti contratti sotto l'antico sistema da e essere soddisfatti sotto il novello? Ovvero, nel caso di danaro fisso, tasse, pedaggi, &c., appartenenti a persone private, a municipii, ovvero ad altri pubblici corpi, ovvero allo Stato, il diritto delle quali era stato acquistato sotto il vecchio sistema, ovvero qualunque altro carico [engagement] fisso?——

R. A peculiari previsioni e disposizioni, che avrebbe potuto richiedere la mutazion del monetario sistema, ov' ella spettato avesse al valore de' nobili metalli assoluto o comparativo, non potè certo dar luogo l'avvenuto riordinamento, che limitossi a surrogare i decimali a' volgari elementi nelle monetarie discipline ed operazioni. Dimanierachè, nell' applicazion del nuovo sistema, le imposte non solo, ma le altre ragioni, ed obbligazioni, crediti, e debiti di qualunque natura ed entità, prima di tale innovazione costituiti o contratti in qualsiasi guisa, e tanto se di stato, o di corpi o persone morali, quanto se delle singole fisiche persone, e fossero in certa e fissa quota, ovvero in eventuale, indefinita, o mutevole, tutt' indistintamente e del pari, a niun' altra modificazione o provvedimento andarono, nè poteano andar soggetti, fuorchè ne' computi alla conversione delle relative somme dall' antica nella nuova moneta, secondo le tariffe, e le basi particolarizzatesi nel precedente No. 24., salvi meramente, pe' volgari conteggi, gli eccezionali usi additati al No. 12.

Q. 26°. Fu il cambio nella moneta di conto gradato oppure immediato? Fu desso volontario o compulsorio? Se compulsorio, come e da quali penalità fu rafforzato? Fu desso rafforzato con successo? oppure continuò lo antico sistema in uso per qualche e per qual tempo ne' conti o nella lingua popolare?——

Q. 27°. Se il cambiamento fu volontario [optional] continuò in uso il vecchio ed il nuovo sistema concorrentemente per qualche tempo, e lo continuano essi ancor adesso?——

Q. 28°. Qual inconveniente sorse da tale uso simultaneo? In qual modo tale uso simultaneo affetta li conti, biglietti di banco, e le lettere di cambio?——

R. Sull' oggetto di questi tre articoli già forniscono risposta gli antecedenti numeri, ed in ispecie il 12°, il 20°, ed il 23°. Sicchè meramente a guisa di riepilogo s'aggiugnerà,

Come in certo modo a gradi, piuttostochè ad un tratto, si venne introducendo ed attuando il nuovo sistema; com' ei fu ordinamento nè soltanto volontario, nè soltanto compulsivo, perchè preceduto da quella propension de' cittadini che gli usi loro dimostrano, e congiunto a quell' assai temperata coazione, che sola è giusta, prudente, ed utile in codesta, non meno che in molte altre materie; l'esempio cioè del Governo per quanto a lui direttamente concerne, in tutte le parti del pubblico reggimento; e la prescrizione unicamente sancita colla disciplinar necessità, e con moderata pecuniaria ammenda, riguardo agli agenti e per gli atti governativi, o pubblici.

Come, più o meno agevole e sollecita, secondo la data dall' introduzione, ed a ragion dell' altre circostanze, ove sovra spiegate, ne progredì l'osservanza, e già da un pezzo è più o meno a buon punto per gli stati continentali, e, nella misura all' eccezionali sue condizione possibile, per la Sardegna.

Come in ciò che ancor mancavi alla perfetta pratica del decimal sistema, con esso concorra l'antico; e gl' inconvenienti che da tal concorso derivino (oltre l'anomalía stessa) consistano in un qualche abusivo maggior valore delle specie effettive, od aumento d'aggio sulle nobili monete, ovvero, per le minute contrattazioni, in una cotal facilità di sbagli od anche di frodi a carico de' men pratici o meno avveduti, precipuamente se forestieri; inconvenienti perciò di niuna od assai poca influenza rispetto all'Erario, alle banche, ed al commercio in grande.

E come in fine alla imperfezion d'attuamento per l'un sistema, ed al corrispondentevi concorrer dell' altro, siano rispettivamente ogetto e causa la restante mole delle antiche specie, massimamente delle piccole, e le abitudini

popolari; senzachè, per quest' ultime, abbiavi altro adatto e convenevol rimedio, che un lungo scorrer di tempo, e per la prima, ch' è ben più grave, la finanziera possibilità d'un dispendioso surrogamento in buone specie decimali.

Q. 29°. Sotto tale uso simultaneo [concurrent] come tengono i loro conti i mercanti, ed i banchieri?——

R. I conti, fin dalla rispettiva introduzione del nuovo sistema, tengonsi in decimal moneta, salve l'eccezioni che da quanto sovra emergono per la Liguria, e principalmente per la Sardegna, rispetto a' privati, ed al piccolo commercio.

Q. 30°. Fu il cambio efficacemente operato, oppure havvi qualche e quale classe di persone, in qualche ed in quale parte del paese, che continui a fare uso delle denominazioni antiche, parlando o tenendo conti?——

R. Li relativi chiarimenti trovansi ai NN. 12, 23, 26, e 29.

Q. 31°. Fu il cambiamento all' epoca di sua introduzione impopolare presso qualche e quale classe della società? Se qualche impopolarità esiste, fu dessa transitoria o durevole? Esiste essa ancor adesso? Cagionà il cambiamento delle commozioni o de' torbidi popolari?——

R. Niuna commozione, niun perturbamento arrecò la innovazion monetaria, come può dedursi da' circostanziati precedenti ragguagli; ned ha od ebbe durevole o transitoria impopolarità veruna appo niun ordine di cittadini (grazie pur anco all' assai ristretta e mite sanzione) ma soli, e per qualche parte, gli ostacoli, e' difetti d'attuamento, che di sopra si svolsero.

Q. 32°. E la moneta nuova più o meno conveniente dell' antica, e quali sono li suoi vantaggi o svantaggi?

1°. Nel pagare, o ricevere,—(*a*) Grandi somme. (*b*) Piccole somme.
2°. Nel tener conti,—(*a*) In grandi transazioni. (*b*) In piccole transazioni.

R. Senza distinzione alcuna fra le ingenti e le tenui somme, le grandi transazioni, e le piccole, l'erariali o bancarie operazioni, li commerciali, e li privati interessi, il riscuotere o pagare, ed il tener conti, utilissimo per più modi, e da svantaggi scevro, sì teoricamente che praticamente, risulta il monetario decimal sistema e dalle ragioni partitamente spiegatesi al No. 12., e dall' unanime consenso non solamente degli scienziati, ma degli uomini d'affari in qualunque genere e classe, e, ciò che più monta, dalla costante, lunga, ed universale sperienza. Imperciocchè li pratici inconvenienti accennati al No. 28., sono attribuibili, non al sistema di cui si tratta, ma per l'opposto al non essersi questo ancor in tutto potuto attuare per ciò che al Governo appartiensi; e la difficoltà delle volgari abitudini è ostacolo più o men forte, ma da quasi sempre aspettare, riguardo a qualsiasi mutamento.

La qual utilità, nondimeno, se pei Sabaudi Stati è verissima ed insieme consimilmente la è per gli altri stati in generale; incontrar potrebbesi qualche difficoltà là dov' esistessero condizioni di molto eccezionali. E così, ad esempio, se presso qualche nazione il venal valore delle altre merci fosse grandemente maggior che altrove, o di molto superiori il gran commercio e la grande industria, e l'unità dell' antica moneta fosse di valore a molti doppi più forte della comune decimale unità, il franco o lira nostr' attuale; il trasmutare in questa relativamente esigua unità quell' antica, e le divisioni d'essa in centesimi dell' altra, come anche il coniar l'equivalenti infime specie effettive, produr potrebbe ed il non-uso di tali troppo tenui monete, e quanto a' conti un disagevole accrescimento di cifre; mentre per l'opposto lo adattare alle decimali forme l'unità antica, in tutto il resto eziandío, ma non nel valore, torrebbe notevol parte de' benefizi dell' uniformità coll' altre nazioni, che già l'accolsero od in seguito l'accogliessero.

Pesi e Misure.

Q. 33°. Sono li pesi e le misure divisi decimalmente? Se così, tale divisione decimale precedette, accompagnò, o seguì dessa la divisione decimale delle monete, o fu con quest' ultima, in qualche ed in quale guisa, connessa? ——

R. Il decimal sistema trovasi nella Sabauda Monarchia esteso, pur anco a' pesi ed alle misure la unità delle quali, fondamental ben anco pei pesi, vale a dire il metro, diedegli peculiarmente il nome di metrico.

Ma fu soltanto ordinato per la Sardegna col Realo Editto del 1° Luglio 1844, e per terraferma col Realo Editto dell' 11 Settembre 1845; da non attuarsi però, ben inteso, fuorchè nel discreto termine ivi prefisso, e stato poscia ancor prorogato.

Chiaro è quindi, che a lunga seguita d'anni la nuova monetaria instituzione restò consociata all' antica de' pesi e delle misure.

Del rimanente il già esposto, quanto a generali osservazioni, circa la sostituzion dello antico al nuovo metodo in punto di monete è consimilmente applicabile a quella eziandío di pesi, e misure, se non che—

Sommamente più grave fu l'importanza della seconda, per la enorme quantità di sorta fra lor diverse, che nelle misure e ne' pesi esisteano, non solamente

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diverse fra li tre massimi spartimenti dello stato, o per ciascuna delle precipue lor divisioni, ma ben anco (e più nell' antico territorio continentale) per ciascuna delle suddivisioni, e quasi anzi per le singole città o comuni non infimi; onde non è a dire qual confusione e quali incertezze, ed impicci ne provenissero alle vicendevoli relazioni fra l'un luogo e l'altro, sì pel commercio e pei privati, sì pel Governo medesimo, benchè in quanto da lui dipendeva e così negli atti di legislazione o di amministrazion pubblica, primamente e ab antico avess' egli e adoprasse una sola e propria specie, denominata Camerale, o di Piemonte, e sol usasse delle precipue Ligure e Sarda per ciò che a tali due spartimenti peculiarmente atteneasi; e dappoi s'avviasse a valersi egli pel primo de' metrici pesi e misure, e ciò da molt' anni innanzi di obbligatoriamente per tutti ed in tutto introdurli: del che natural conseguenza pareva a primo aspetto aver ad essere lo affrettar codesta rilevante innovazione, per guis' almeno che, se non accompagnasse il monetario ordinamento, poco stante il susseguisse; e tanto più per terraferma, ove a' tempi della Francese occupazione statuito il metrico sistema, rimasto era più anni obbligatorio, non cadendo fuorchè nel Maggio 1814, al risorgervi delle avite leggi ed instituzioni.

Sommamente però più intricata e difficile, che per la moneta, riuscivane l' attuazione pei pesi e misure; poichè una era la nuova monetaria unità; sola una divisione, sola una ragion di ragguaglio coll' antica pur unica per ognun dei tre scompartimenti, e una grande semplicità di computi; ed all' opposto, fra misure e pesi, sei nuove unità, e tre, quattro, o più fra multipli, e divisioni non sol per ciascuna, ma in varia più o meno ascendente o discendente graduazione secondo specialità d'oggetti; diverse denominazioni; e ragioni di ragguaglio diverse; ed altrettante di novero, quante si erano per ciascuna città o comune come sovra le antiche unità loro, e d'ogni lor unità li tre, quattro, o più multipli e summultipli! Quind' il lungo indugiare a rinnovarne la prescrizione, aspettando per avventura, che l'esempio del Governo, ed il progredir dei commerciali rapporti, con Francia massimamente, venissero a poco a poco giovando ad infievolire le resistenze dell' antiche popolari costumanze, contra cui bastato pienamente non era l'imperio della legge durante la straniera signoría, imperio anzi, che nella Francia medesima, già da sessanta anni in assiduo vigore, non ha forse ancor potuto svellerle onninamente.

A stabilire impertanto codesta metrica forma tornavano indispensabili non solo i maggiori preparatori avvedimenti, il lasciar tempo, come si disse, fra la promulgazione e l'esecutorietà della legge, il procacciare agevoli modi a ben conoscere intanto le particolarità del sistema ed a impratichirvisi, ma eziandío il dargli efficacia, con più estesa obbligatorietà e men lieve sanzione; onde a pena di confisca de' pesi e misure antiche, e sotto e aggiuntevi pecuniarie multe secondo i casi, fu, in qualsiasi luogo al pubblico accessibile, proibito l'usarle, ed anche solo il tenerle, ed imposto lo avere e adoprar le nuove; ed in queste contrarre, tenere i conti, e fare qualsiasi atto benchè sol con privata scrittura; nè unicamente per gli uficiali a servigio dello stato od a quello del pubblico, ma per tutti indistintamente gli addetti a commercio, traffico, arte, o mestiere qualunque, ed a' privati medesimi.

Per altra parte poi riuscivane bensì compiuta la real attuazione in tutto ciò che al Governo, ed a' sudditi uficiali appartiene; e così pure, in quanto estendesi per le varie divisioni dello stato, l'assidua fiscale azione, e vigilanza, riguardo alle industrie ed ai traffici eziandío minuti, ed a' pesamenti e misuramenti qualunque in luoghi non assolutamente privati; ma non per anco passò ne' quotidiani usi de' privati; i quali sogliono generalmente, nel provvedersi del bisognevole da' negozianti e fabbricanti, farne la domanda e l'acquisto ad antico peso, ed ancor più a misura antica, quantunque ne deggiano, per le picciole partite in ispecie, sopportar qualche danno; poichè il venditore astretto a procedervi per via di ragguaglio dai pesi o misure metriche, tutte incommensurabili colle volgari, ed in esse impossibili ad esprimersi con pratica esattezza, obbligato perciò a guadagnarvi od a perdervi alcunchè nel prezzo, presceglie ben naturalmente il primo di questi due mezzi.

Q. 34°. Nel caso negativo si trovano o sorgono degli inconvenienti dalla divisione de' pesi e delle misure non corrispondente alla divisione delle monete?——

Q. 35°. Come è la divisione decimale della moneta conciliata con quella non-decimale delle mercanzie [of commodities] nelle transazioni della vendita al minuto presso le classi povere? Ne sorgono forse degl' inconvenienti, o delle perdite?——

R. La decimalità della moneta e quella de' pesi e misure non avendo tra esse altra connessione, od affinità, fuorchè nella somiglianza,—

1°. Delle due unità, di cui quella per li pesi è il gramma, equivalente in gravità ad un centimetro cubo d'acqua distillata a 4° centigradi che si pesi nel vuoto, e così dedotto dalla stessa fondamentale e precipua delle unità di misura, il metro; e per la moneta è la lira, la qual, in lega d'argento a 9 di fino su 10, pesa grammi 5:

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2°. Della graduazion di valori per questa, e di gravità per entrambe.

Non è l'una dipendente punto dall' altra, sicchè ciascuna da sè isolatamente produr non possa in tutto gli utili effetti suoi, od a conciliare codesta nuova forma nella moneta insiem coll' antica ne' pesi e nelle misure occorra provvedimento alcuno.

E niuno in fatti sen diede; nè perdite, ned altri sconci, per niun genere d'affari, e per niuna classe di persone, provennero nel diuturno periodo misto come sovra di decimal sistema per l'una materia, e di volgare per l'altra; qualor si eccettuino, ben inteso, tanto gl' inconvenienti propri del secondo (fra cui pur la molto incomoda complessità de' numeri) quanto la frequente necessità di conteggiare a duplice abbaco, e la sgradevole dissonanza, per diversità di metodi, fra due rami di servigio, attinenti siccome questi, e da coordinarsi l'uno coll' altro.

Malgrado però queste mende, a chi ben ponderi la cosa in tutti gli aspetti suoi, parrà più avveduto e profittevol consiglio il non affrontare con due gravi (non inscindibili) mutamenti ad un tratto gl'inveterati usi d'un popolo, e perciò differire il più malagevole, sinchè al men difficile già siasi avvezzato.

Questioni Generali.

Q. 36°. Aggiungete qualunque altro documento, od informazione, che voi possiate considerare come utile alle presenti ricerche; ed oltreacciò, insieme alle vostre risposte a codesti quesiti, copie di qualunque legge, ordinanza, rapporto, o pubblico documento su tale subbietto, descrivendo li cambiamenti di moneta, le ragioni per la loro adozione, ed il modo in cui furono posti in esecuzione?——

R. Triplice si è il generico oggetto di quest' ultimo quesito.

E quanto al 1° alla descrizion cioè dei monetari cangiamenti, di lor cause, e de' modi d'esecuzione, ossía pe' sistemi, e applicazion loro alle monete e di conto e di cambio, ossía per le parziali variazioni avvenute nell' effetive specie e nelle tariffe, già se n' è partitamente trattato ne' precedenti numeri.

Tuttavia, intorno a' modi d'eseguimento può ancor notarsi, che, nell' ordinare l'abolizion di specie, o cessazione di lor battitura, e sostituzion d' altre, andaronsi le prime ritirando dal corso all' intero valor nominale, e non al solo reale del fino, purchè ne' prefissi discreti termini, e nei limiti di tolleranza pel peso, fossero alla zecca recate, e della ritrattane materia si fabbricarono le nuove monete da surrogarvisi; al coniamento delle nuove precedettero sperimenti su grandi masse delle antiche, per chiarirne in attual media effettiva il peso in lega ed il titolo, e per poi su tal base procedere alla fabbricazione in economía, ma per lo più in appalto a tanto peso di nuove per tanto d'antiche; ne' casi di mera cessazion di battitura senz' abolizione se ne vennero meramente fondendo, e nelle nuove riconiando quelle partite, che di mano in mano se ne versassero nelle casse pubbliche dai debitori dello stato; e lasciaronsi anzi, per intero o quasi, sussistere varie di quelle specie, la cui grand' entità, oppure grav' eccedenza del nominale sul real valore, o le due cause riunite importato avrebbero un dispendio ingente alle circostanze non adeguato; e le esclusioni dalla tariffa di straniere già ammessevi monete unicamente importarono la fusione ed il riconiamento in nuove nazionali, come sovra, delle quantità, che all' atto e momento dello escluderle se ne trovassero appo l'Erario, e di quelle che, pel solo real prezzo della materia (in peso attuale, e a titolo effettivo) fossero da chicchessía presentate al cambio in zecca.

Circa poi le cause delle variazioni alle specie e tariffe,—

Oltre quelle comuni all' abolizion delle antiche monete d'argento, sian di Piemonte, siano di Genova, di tutte l'erosomiste della 2ª, e d'alcune fra l'erosomiste e l'erose del 1°; all' instituzione, per ambi, delle decimali monete nelle tre serie; alla successiva ammession loro, per le prime due, nella tariffa di Sardegna; ed allo stabilimento per essa d'una peculiare decimal serie in rame; le quali comuni cause furono e la pratica applicazione ed esecuzion del nuovo sistema, come prima ed in quanto riuscisse possibile, e l'interesse e l'officio, pel monetal servizio, di andar togliendo dal corso le vecchie già logore e liscie specie; il qual ultimo fu pur motivo al togliere di tariffa le inframmentovate specie straniere, ma non fu il solo.

Concorsero pel luigi d'oro e suo doppio, pel vecchio scudo, e pel venticinque centesimi di Francia, e per lo scudo di Milano, la preceduta abolizion loro negli stati cui apparteneano; e riguardo a' luigi e lor doppi le molte frodi, ed anco le contraffazioni operatene in grande, massimamente fuor di Francia, in seguito a furto de' punzoni legali.

Per la Sardegna, non furono ammessi gli scudi di Milano, del già Regno d'Italia, e di Genova, nè gli spezzati loro; perchè già tolti di corso in terraferma molt' anni prima, che la Sarda attual tariffa emanasse; vi si compresero però, malgrado parità di ragione, l'antico scudo di Piemonte, e' summultipli, probabilmente perchè tuttora ve n' avea colà notevol copia in circolazione, a

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differenza delle consimili specie Genovesi; e forse il medesimo è a dire delle ghinee, pe' rapporti dell' Isola con quelle del Britannico Imperio; all' opposto non menzionaronvisi alcun de' pezzi da centesimi 25, li due multipli della vecchia doppia di Savoja, ed il mezzo cagliarese, perchè quest' ultimo nè confonder poteasi col proprio doppio, il cagliarese, pareggiandoli nel nominal valore di 1 centesimo, nè conciliabilmente colla uniformità nel nuovo sistema, ridurlo a mezzocentesimo, ossían millesimi 5, nè convenevole si credette il forzare l'altro a centesimi 2; e altronde ben poca o nulla esser doveane la quantità in corso; perchè, rispetto a' multipli della doppia suddetta, nulli esser doveanvi, già pochissimi avendone il Piemonte; e perchè, riguardo al venticinque centesimi, avrà sconsigliato dal tariffarlo il riflesso, che già ne' Reali Stati Continentali doveasene sospendere l'ulterior coniamento; nè vi s'inclusero le specie erose, nè tampoco l'erosomiste, siano antiche sian nuove, spettanti a terraferma, siccome non furono ammesse nella tariffa di terraferma nemmen le nobili specie Sarde; non ricevutevi queste, a ragion del bisogno che anzi aveavi di colà spedire de' fondi dal continente; e quelle reciprocamente rejette, perchè allora la terraferma e l'Isola due diversi stati costituivano, e monete d'infima o bassa materia acconcie non sono a legalizzarsi per altro stato che l'emittente.

Relativamente, in fine, alla decimal serie in oro, se nel 1832 instituironsi le specie da 100 lire, e da 50, in luogo delle primitive da 80, e da 40 (lasciato però in corso il già coniatone); se ad un tempo vi si aggiunse la moneta da L. 10; e se quindi mandò il Governo si sospendesse l'ulterior battitura e della menoma tra le pezze d'argento, e delle due maggiori in oro: la prima e la seconda di queste prescrizioni mossero non solamente dall' esempio che ne diè la Francia, ma ben anche dal proposito di meglio a decimalità ordinar la serie nel primo de' nobili metalli, e meglio pur collegarla, e coordinarla alla serie nel secondo, sicch' ella avesse il decuplo della lira, donde passasse a quello di lire due, salisse poscia a quel dello scudo, e si compiesse col decuplo dell' infima tra le proprie specie; alla terza disposizione poi spinsero li risultamenti della esperienza, le monete da 50 e da 100 lire, al pari e più dei dopp, luigi, agevolare, pel lor valore e profondità, il fraudolento maneggio del bipartirle con taglio per lo spessore, e, vuotatele, d'un tondino d'ignobil legai a peso non guari diverso dal detratto, riempierle, poscia le due superficie, serbate intatte, perfettamente saldarle al tondino stesso, e nel contorno fra lor ricongiugnerle; del resto cotali monete sparir di circolazione appena ch' emese vi entrano, o poco stante; ed insiem parere, che il commercio anteponga a tutte le altre decimali specie in oro quella da 20, molto anteriore, più diffusa, e più comoda, onde in Francia pure fu tenue l'emissione di quelle due monete, e fra lo stabilirle, ed il batterne molti e molt' anni corsero: la monetina poi d' $\frac{1}{4}$ di lira, essersi chiarita men gradevole al pubblico, stante il troppo esiguo diametro dalla vigente legge assegnato, e la cui ampliazione attemprar dovrebbesi alla solidità necessaria pel coniamento, e per l'uso, ed a non soverchia logorabilità.

Or dal 1° venendo al 2do argomento del final numero 36, ch' è la richiesta delle leggi nostre monetarie, e dell' altre provvigioni e documenti utili sulla materia, se ne unisce al presente scritto un indice, ed insiem con esso una copia per quante fu, senza maggiori indugi, possibile l procacciarla; di più vi si aggiugne un quadro sinottico di paragone fra l'attuale monetazion dei Reali Stati, e quella dell' Impero Francese.

Alla cui maggiore dilucidazione e compimento, non meno che a rispondere sul 3° ed ultimo obbietto di questo finale articolo, al desiderio cioè di quell' altre informazioni ed osservazioni, che l'amministrazion delle Reale Zecche reputerebbe di qualche pro agl' intenti de' quesiti dalla Britannica Commissione proposti; si chiuderà la presente relazioni coi dati che infra.

Il nuovo monetal sistema di Francia, sì per la riconosciutane bontà intrinseca, e proficua applicabilità in questo regno, sì per aver esso ben maggiori le relazioni con quello stato che non cogli altri, fu accolto dal Sabaudo Governo e nelle basi, e ne' particolari, tanto dell' ordinamento quanto dell' attuazione, e sia per la moneta di conto e per l'effettiva, sia nel personal del servigio, e nel materiale, sia nelle varie operazioni di cambio, di fabbricazione, di verificazione, e di controlli; tranne alcune eccezioni al primordiale organamento, e vieppiù alle modificazioni che poi vi si fecero; eccezioni richieste da peculiarità di cause, e massimamente da diversità di nazionali o finanziere condizioni; già in parte chiarite dal citato quadro sinottico, e fra cui le meritevoli di special menzione, e di ulterior disamina, sono,—

1°. Che, mentre la Regal Prerogativa della Moneta è giusta le leggi, siccome ovunque, esercitata presso amb' i popoli dalla sovrana autorità, senza la menoma direttiva od invigilativa ingerenza d'altri che de' propri ufiziali a ciò stabiliti; e così è rimosso ogni rischio d'influenza estranea, e di lesione al geloso credito monetale; dirige a un tempo, e sopravvede cotal servigio in Francia una permanente commissione, che consta di presidente, di tre altri

membri, e di due commessari generali, con adeguato numero di subalterni impiegati; fra cui specialmente un controllore a' punzoni e conii, ed in ogni zecca un commessario, due controllori o verificatori, ed un commesso o scrivano; e presso noi la Centrale Amministrazione delle Zecche, composta d'un amministrator capo, d'un primo segretario, od amministratore in 2do, e del segretario, cui s'aggiungono pochi altri uficiali, e fra essi, in ciascuna zecca, un commessario, un verificatore, ed un controllore deputatovi e soltanto dipendente dalla Camera o Corte de' Conti, che tien sulla moneta una speciale antica sovrintendenza.

2°. Che la retribuzione ai nostri incisori consta di stipendio, di prestatuito o convenuto prezzo a ciascun dato lavoro; quandochè in Francia la retribuzione per tal servigio è tutta nel prezzo de' lavori: del qual divario è cagione il doversi ugualmente appo noi provvedere a' bisogni del servizio ove ed in quant' occorrano, ed il non avervi quella costante più o men ragguardevole quantità di lavoro, che in Francia esiste.

3°. Che riguardo alla monetaria fabbricazione, fra li due modi, l'esercizio ad economía, e quel per appalto, migliore il primo per maggior finitezza e beltà di coniato, più cauto e men dispendioso il secondo, è quest' ultimo in vigore per ambi gli stati; ma, come già si disse degl' incisori, e pel motivo stesso della diversa rilevanza d'opera, il direttore in ciascuna zecca Francese, è un appaltatore soltanto, paga del suo non solamente tutti gli operai e uomini di fatica, e le provvigioni occorrenti a lavorare i metalli ed in monete ridurli, ma eziandío li conii stessi, e la conservazione, e all' uopo rinnovazione di tutto indistintamente il materiale, onde il monetario opificio è primordialmente dall' Erario fornito; e di tutte queste spese e di sue fatiche il rimerita la quota, dalla legge prefissa a tanto il chilogramma di materia, ritenibile a' venditori sul tariffato valor della medesima; mediante la qual ritenuta, non avvi alcun tacito sconto, nè a lor pregiudicio sull' effettivo titolo della materia stessa, nè a danno del pubblico sull' effettivo titolo della moneta, qualmente dicesi a rifazione accadere in altri stati; ed in vece il direttore in ciascuna zecca da noi è appaltatore ed impiegato ad un tempo; non sopporta di proprio una parte delle mentovate spese, dovendo l'Erario somministrargli li conii, e provvedere alle maggiori o straordinarie riparazioni, ed al rinnovamento, occorrendo, di parte del materiale; ed, oltre il montar dei dritti di fabbricazione per via di ritenuta sul valor come sovra, ei fruisce d'un modico stipendio.

4°. Che, sebben due o tre zecche, od anche una sola, secondo l'importanza, e le altre condizioni de' singoli stati, possano bastare agli ordinari bisogni del monetario servizio; ossía la previdenza pei casi di più urgente, o maggior lavoro, od eziandío d'altre emergenze straordinarie, ma possibili ad avvenire e già talvolta avvenute, ossían gl' inconvenienti del troppo centralizzar nella capitale, come all' opposto e vieppiù del lasciar la capitale priva d'un istituto qual è il monetario, e la insignificanza del quindi aspettabile risparmio di spesa, ossían queste ed altre cause insiem riunite, v'han tuttora, oltre la zecca in Parigi e in Torino rispettivamente, altre 6 in Francia, ed 1 nella seconda fra le città de' Reali Stati, vale a dire a Genova, già da molt' anni trovandosi di fatto abolita quella di Cagliari.

5°. Che riguardo alle partite non minime, li direttori ne' monetari stabilimenti di Francia pagano il valor delle materie ai portatori, col mezzo di cambiali ad 8 fino a 15 dì, od anche a più lunga scadenza; e appo noi li direttori vi soddisfanno od incontanente, od entro l'assai breve spazio indispensabile a compiere un' adeguata fabbricazione; pel che lor mancherebbe onninamente la possibilità, ove le finanze non avessero, siccome fecero, dotato *ad hoc* le rispettive due zecche d'un fondo, tra ambedue, e parte in oro, parte in argento, di L. 400/^{m}; e tanto più mancherebbe la possibilità, che al dover di continuo restar giacenti fra materie ne' vari stadi di lavorazione, e fra ceneri, limature, ritagli, e simili, una somma ragguardevole, aggiugnesi, per instituti, come questi, di minor rilevanza che i Francesi, il ben minor lucro dal men di lavoro, e quind' il niuno eccitamento ad assumere tali appalti per chi, già di cospicuo capitale in proprio fornito, possegga di più i lumi e massimamente la pratica necessaria, per non riuscir poi a scapito e rovina ove di un discreto profitto affidavasi.

6°. Che tal ragione d'assai men lavoro spiega non pur la necessità di alleviamento ne' carichi, e dell' aggiunta come sovra d'uno stipendio a' direttori della fabbricazion monetaria in questo regno, ma il bisogno ben anche d'altra più importante differenza tra le zecche nostre, e quelle di Francia; che cioè pari affatto è sibbene il valore delle nobili monete in ambi gli stati, siccome conflatevi d'egual peso d'oro, o d'argento, a titolo uguale (900 parti di fino su 1,000 di lega), ed alla stessa tariffata ragione di L. 3444 · 44 · 444... il chilogramma di fino per l'uno, e di L. 222 · 22 · 222... per l'altro, non potendosi del resto e non dovendosi in monetazione tener conto de' più o men lievi e pur sempre mutevolissimi aggi sull' una o sull' altra materia. Ma la ritenuta

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che a' venditori si fa sul mentovato prezzo, pe' dritti, ossía per le spese di lavorazione, ritenuta, che da noi ragguagliasi a chilogramma in fino, da' Francesi a chilogramma in lega del titolo di 900 millesimi, che cede in retribuzione come si disse a' direttori, e su cui forza è per essi, alfin di serbarsene ed accrescersene l'avviamento, consentire a' cambiatori di non picciole partite uno sconto (e lo stesso è a dire delle tre altre accidentali ritenute di fusione, di partimento pe' dorati, e d'affinazione per le materie a titolo inferior del monetabile), potè in Francia ridursi, più anni sono, per l'oro a sole 6 lire, ed ora è a L. 6·70, e per l'argento a L. 1·50, sul peso in lega, corrispondenti su quello in fino a L. 7·44·444..., ed a L. 1·66·666..., rispettivamente; quandochè nelle zecche nostre non s'è finor potuto limitare a men di L. 8·44·444..., e di L. 2·72·222..., nè per modo alcuno ristringer potrebbesi ulteriormente, a pena, se in appalto, di più non rinvenire idonee e sicure persone che incaricar sen volessero, e se ad economía, d'aver ancora ad aggravare, del più sborsato che ritenuto a talfine, l'onere delle spese generali, e di alcuni, fra gli speciali dispendi, che il Realo Governo, al par d'ogni altro avente buona monetazione, dee già, senza verun rimborsamento, sostenere per siffatto servizio.

7°. Che stante la medesima causa, di minore e discontinua fabbricazione, ed il potere i monetari meccanismi di nostre zecche esser mossi colla forza dell' acqua appigionabile, in Genova, e delle molta e perenne acqua demaniale, in Torino (oltre il sussidiario impiego, ove d'uopo, de' cavalli, e delle braccia d'uomini), non vi è usato, nè punto vi converrebbe il vapore; quandochè in Francia è, quasi pel tutto, ben opportunamente prescetto, e con molto vantaggio adoprato.

8°. Che fra le tre sorta di ghiere, la bifida ed a incavo incisa, cui diciamo spaccata [virole brisée], la scanalata, e la liscia, e fra le tre corrispondentivi specie di contorni alle monete, l'inscritto a rilievo, lo scannellato o striato, ed il liscio, cui è da aggiugnere l'altro (che operasi mercè un secondo cordonamento ai tondini), il contorno inscritto ad incavo; la prima guisa è prefissa alle zecche Francesi per le tre maggiori monete d'oro, e per la maggiore d'argento; la seconda, per tutte le altre in amb' i metalli; la terza per le monete ignobili; sicchè non avvi colà uso alcuno del contorno inscritto ad incavo: e questo pel contrario, insiem colla ghiera liscia, è statuito alle zecche nostre per le tre maggiori monete in argento; ghiera, e contorno lisci per le minori, e per le tre in rame; e striati per quelle in oro: delle quali diversità presso noi è ragione il più costare ed il men durar della ghiera spaccata; il potersi forse contrapporre ai tre pregi di essa (miglior regolarità ed uniformità nello improntare il contorno, simultaneità di siffatta impressione con quelle del ritto e del rovescio, e cresciutane difficoltà pe' falsatori), che gli aumentatine punti di rilievo e perciò di attrito, senza tutela d'orlicci come all' effigie ed all' arme, agevolano in tal parte il logorío della moneta; e del rimanente il dar la forma di striato a sole e tutte le specie in oro accrescerne li distintivi, per chiunque anche rozzo e analfabeto visibili a colpo d'occhio, acciò facilmente le discerna dalle specie d'argento a consimil modulo, che s'indorassero, od a colore aureo s'inverniciassero, come talor avviene.

9°. Che ultimamente nella monetazion Francese la serie in oro accrebbesi d'una quinta specie, il pezzo da L. 5; innovazione questa eccezionale, dettata da staordinarie circostanze, e perciò temporanee, peculiari a quello stato; innovazione pertanto che non s'ammise nella monetazion Sabauda, per cui non sarebbevi stata ugual ragione di derogare alle norme comuni, dissuadenti dal coniar in oro specie di valor pari a quelle in argento, e specie preziose per la materia a modulo sì esiguo, da riuscirne e men comodo il maneggio, e ben agevole lo smarrimento, e assai più forte e di più danno il consumo; e ciò tanto più in Istato, quale il Sabaudo, ove la consimile picciolezza della monetina da centesimi 25 in argento, benchè a sì tenue valore, richiederebbe, come a suo luogo accennossi, qualche mutamento nelle dimensioni, per tornarla in favore del pubblico, e poterne convenevolmente ripigliar l'emissioni.

10°. Che siffatta variazione consistendo principalmente nell' aumentare il diametro della detta specie (aumento, che seco trarrebbene un altro per la moneta da centesimi 50) non poteasi al certo seguire il contrario operato di Francia, ove, non è gran tempo, fu al venticinque surrogato il venti centesimi, ravvisandola qual moneta in peso e valore, più dell' altra decimale, e più omologa al duelire, ed al ventilire: poichè questo surrogamento, importando la diminuzione di $\frac{1}{5}$ nel peso, avrebbecene imposta pure un' equipollente o nel diametro già troppo esiguo, o nello spessore, che già, in riparo al primo difetto, assottigliar converrebbe, e non sarebbe poi in ragione d'ambi gl' intenti assottigliabile, senza troppo estenderne gli attriti, la logorabilità, ed anche la difficoltà nel coniare: nè altronde appo noi vi aveano le circostanze che dovettero colà influirvi, la esistenza cioè d'una ingente massa di

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tali monetine, battute e poste in circolazione non da 25 o 30 anni al più, come le nostre, ma da tempo doppiamente rimoto, e quind' in gran parte a tal di liscio ridotte, da urgentemente bisognarne il richiamo a zecca, e la conversione in nuove specie.

11°. E finalmente, che quanto alla serie d'ignobili monete, se la Francia, ritirato e abolito affatto l'antico erosomisto, stimò d'aver a costituirla di 4 specie, anzichè di 3 sole, ed a serbarvi per 1ª (benchè superiore all' ordinario limite di valuta in codest' infima serie) il decimo di lira, siccome decupto del centisimo, duplo del cinque centesimi, e sudduplo del venti anzidetto; se al trecentesimi sostituì il due, perchè decimale, e correlativo alle altre monete; se per le quattro nuove specie, in luogo del rame, trovò preferibile il bronzo (composto di 95 parti in rame, di 4 in istagno, e di 1 in zinco) perchè tenuto inossidabile, di somma resistenza agli attriti, e di più difficile contraffazione per galvanoplastica, o gitto; se credette, in eccezione alle comuni regole del monetario sistema, di gravemente sminuirne il peso e con esso il real valore (fatto pur conto del maggior costo di lavorazione) rimpetto al valor nominale, pel trattarsi di danaro a mero interno uso ne' minimi traffichi e nei resti, pel non potervi esser lucro allettante al falsificare se non se in grandi quantità, e pel riuscirne il falsamento assai malagevole stante li suddetti motivi, e la gran precisione e finitezza d'impronte, in tali benchè umili specie, ordinate; se opportuno le parve il renderne obbligatorio il ricevimento, a compiere le frazioni non solamente dell' ultimo spezzato d'argento, o al più della lira come da noi, ma dello scudo medesimo, al che da noi fu sol ammesso l'erosomisto; e se alcuni di codesti cangiamenti avrebbero, a parità di circostanze, convenuto pur anche a questi Reali Stati: fra altri motivi, ostavano all' introdurvi la specie da centesimi 10, l'essersi anzi già abolita una preesistente consimile moneta (il soldone che pur era in bronzo), e l'esistervene tuttavia, sebbene in assai picciola quantità, una in viglione, quasi pari in nominal valore (centisimi 12·5), e di oltre il doppio in valor reale; al cambiare il rame in bronzo, le difficoltà d'eseguimento maggiori per le zecche nostre non provvedute di mezzi uguali a quelle di Francia; principalmente poi, e sul tutto, l'ancor durare appo noi una ingente mole d'erosomisto, che unita all' entità dell' antico e nuovo eroso nostro riesce, a ragguaglio fra l'una e l'altra popolazione, molta più che la quantità di danaro in bronzo mandatasi colà emettere in vece del rame; il non potersi certo codesta conversione ravvisar necessaria, ed urgente, nè anche per l'eroso non-decimale, quanto sarebbe lo abolire il viglione riducendolo in nuove specie d'argento, ed anche il riconiare in decimali monete l'antico argento ed oro; il dovere perciò la prima di queste tre operazioni (quando pure la si estimasse utile, ed opportuna) susseguir come in Francia, od al più accompagnare, ma non ma precedere le altre due; il volersi alla seconda e alla terza un dispendio dall' erariali condizioni finor dissuaso; ed alla prima od il sovraccarico d'altra spesa oppur gl' inconvenienti della rifazione mercè grave scemamento nel peso della materia, e così nel real valore; il non aver ancora una sufficiente esperienza chiarito la realtà de' vantaggi teoricamente aspettabili dalla monetazione in bronzo; e massimamente l'esservisi quel Governo determinato, allorchè l'infima delle monetali sue serie trovandosi di fatto, a differenza della nostra, non solamente constare di sette specie, per varietà e di duplice sistema e di metallo duplice e di triplice lega, eterogenee fra loro, ma ben anco, in gran parte, ad impronte obliterate, riusciva di necessità il ritirarla, e nell' un modo o nell' altro rinnovellarla.

Torino, dall' Amministrazione Centrale delle Reale Zecche, li 17 Giugno 1856.

L'Amministratore in Capo,

Intendente Generale,

CATTANEO.

Quadro Sinottico di Paragone fra l'attuale Decimal

I. Prezzi dell' oro, e dell' argento, a chilogramma, netti dalla ritenzione per le spese che d' uopo a monetarli. (A.) Oro. Al titolo di millesimi. 1,000	I. Argento. Al titolo di millesimi. 900	II. Materia, e valori delle monete. Materia e Serie.	II. Valori. Nominale (legale o monetario) Li. Ct s.	II. Reale, cioè della sola materia al titolo di 1,000. (D.) Li. Cts.	III. Taglio a Chilogramma. Numero de' pezzi.	V. Diametro. Millimetri. (F.)	V. Titolo. Millesimi.	VI. Peso in lega (al pezzo). Giusto. (D) H. Grammi.	VI. Abbondante (ne' limiti della tolleranza). (I.) Grammi.	VI. Scarso (ne' limiti della tolleranza). (I.) Grammi.	VII. Tolleranze in più, ed in meno. Sul titolo. Millesimi.	VII. Sul pezo. Al 1,000 o Chilogramma. (I.) Millesimi o Grammi	VII. Sul pezo. Al pezzo. (I.) Milligrammi.
Li. Ct.	Li. Cts.												
			100 0	Sa. 99·75,482	31	34		32,258·06	32,290·06	32,226·06			32·
				Fr. 99·78,385		35			32,290·32	32,225·80		1	32·26
			50 0	Sa. 49·87,741	62	27		16,129·03	16,145·03	16,113·03			16·
				Fr. 49·89,192		28			16,145·16	16,112·90			16·13
Sa. 3436 0	3092·40												
Fr. 3437 0	3093·30	Oro	20 0	Sa. 19·95,095	155	21		6,451·61	6,464·11	6,439·11	2		12·50
				Fr. 19·95,676					6,464·51	6,438·71			12·90
												2	
			10 0	Sa. 9·97,546	310	18		3,225·80	3,232.05	3,219·55			6·25
				Fr. 9·97,836		19			3,232·25	3,219·35			6·45
			5 0	Fr. 4·98,918	620	17		1,612·90	1,617·74	1,608·06		3	4·84
			5 0	Sa. 4·93,875	40	37	900 (G.)	25	25·075	24·925		3	75·
				Fr. 4·96,250									
			2 0	Sa. 1·97,550	100	27		10	10·050	9·950			50·
				Fr. 1·98,500								5	
	Sa. 219.50		1 0	Sa. 0·98,775	200	23		5	5·025	4·975	Sa. 3 (G.)		25·
	Fr. 220.55.555 (B.)	Argento		Fr. 0·99,250							Fr. 2		
			0 50	Sa. 0·49,387,500	400	18		2·50	2·518	2·482		7	18·
				Fr. 0·49,625					2·5175	2·4815			17·50
			0 25	Sa. 0·24,693,750	800	15		1·25	1·2625	1·2375		10	12·50
			0 20	Fr. 0·19,850	1000			1	1·010	0·990 (I)			10·
Le monete a rincontro constano di materia, (C) non già (come l'oro e l'argento) recata al Combio in Zecca da chicchessia, ma direttamente ed unicamente provveduta da parte e per conto del Governo.		Rame	0 5	Sa.	100	28		10	10·200	9·800		20	200·
			0 3	Sa.	166 (E.)	23	(G.)	6	6·144	5·856	(G.)	24	144·
			0 1	Sa.	500	19		2	2·040	1·960		20	40·
		Bronzo	0 10	Fr.	100	30		10	10·100	9·900	10/ pel rame (G), 5/ per lo stagno (G), e 5 per lo zinco (G).	10	100·
			0 5	Fr.	200	25		5	5·050	4·950			50·
			0 2	Fr.	500	20	1000 (G.)	2	2·030	1·970		15	30·
			0 1	Fr.	1000	15		1	1·015	0·985			15·

* Per ogni chilogramma di coniat

Annotazioni.—Nella compilazione di questo quadro si seguì, per la parte concernenti alla Monetazion Francese, la Tabella trasmessacene da Cavaliere Durand, non quella ch' ei mandava nel Novembre del 1852, ma l'altra inviata verso la metà del 1854, siccome racchiudente le variazioni ed aggiunte in tale intervallo operatesi ; e di più s'ebbe cura d'inserirvi gli altri posteriori additamenti e cangiamenti ; quali, in ispezialità, l'accrescimento del modulo per le due più piccole specie in oro, statuito precedentemente a soli 17, e 14 millimetri ; e le nozioni sulle due maggiori specie, state bensì da molt' anni ordinate, ma solo ultimamente battutesi.

NETAZIONE de' REALI STATI, e quella dell' IMPERO FRANCESE.

VIII.			IX.				X.		XI.			XII.		XIII.	
ione de' coniamenti in ispezzati, etto alla totalità de' coniamenti.			Pezzi da prelevarsi, pel saggio, su ciascuna fabbricazione.				Ritenzione, per le spese sul valore della materia, a chilogramma. (M.)		Spese di			Opifici monetari.		Legislazione.	
In astratto,		In valore, per ispecie, sovr' ogni L.10/m.	Numero. (K.)	Peso. (L.)			In fino, cioè al titolo di millesimi 1,000.	In lega, cioè al titolo di millesimi 900.	Ve rifica zione. (O.)	Conii. (O.)	Ghiere spaccate. (O.)	Città, ove sono stabiliti. (P.)	Segni di Zecca.	Sabauda.	Francese.
ie.	Per ispecie.			Giusto.	Abbondante.	Scarso.									
		Li. Cts.		Grammi.	Grammi.	Grammi.	Li. Cts.	Li. Cts.	Li. Cts.	Li. Cts.	Li. Cts.	Savoja.		V. l'unito Indice delle Leggi, ed altri Atti del Governo circa la moneta.	Decreto di Francesco 1°, 14 Luglio 1539.—Legge 7 Germinale, anno XI.—Deliberazione, 10 Marzo 1832.—Decreto, 13 Aprile 1848; altro del 3 Maggio d'esso anno; altro del 22 Maggio 1849.—Tariffa annessa al Decreto del 15 Settembre, detto anno.—Instruzioni della Commissione, 31 Dicembre, anno stesso.—Legge, 6 Maggio 1852.—Quaderno degli oneri per le opere in esecuzion d'essa Legge, del 12 Agosto 1852.—Instruzione, 30 Dicembre di quello anno.—Deliberazione, 24 Settembre 1853.—Decreto, 12 Gennajo 1854; altro (della Commissione), 14 successivo Marzo; altro 22 stesso mese; altro (del Ministero delle Finanze), 23 detto Marzo.—Deliberazione del 27 Marzo stesso.—Tariffa annessa a Decreto d'Aprile 1854.—Deliberazione del 6 d'esso mese.
			6	193,548·36	193,740·36	193,356·36				Francia *		Torino.	Testadi.		
			6		19,374·92	193,354·80				0·15 ?		Genova.	Aquila. Ancora.		
			6	96,774·18	96,870·18	96,678·18						Caglieri.			
			6		96,870·96	96,677·40	Savoja.			id. ?		Francia.			
							0 8,44·444 (B.)	7 60							
			6	38,709·66	38,784·66	38,634·66	Francia.								
					38,787·06	38,632·26	0 7,44·444 (B.)	6 70		0·15		Parigi.	A.		
	In lire dieci, $\frac{1}{200}$.	50 0													
	In lire dieci, $\frac{20}{200}$.	1,000 0	6	19,354·80	19,392·30	19,317·30						Roano.	B.		
ri					19,393·50	19,316·10				0·20		Lione.	D.		
	In lire cinque, $\frac{10}{200}$.	500 0	6	9,677·40	9,706·44	9,648·36			Francia, 3 0 (per ogni 6/m pezzi)	0·40	Francia, 40 0 (per ogni 200/m.	Bordò.	K.		
			6	150·	150·450	149·550						Strasborgo.	B.		
			8	200·	200·600	199·400									
	In lire due, $\frac{8}{400}$.	150 0	6	60·	60·300	59·700						Marsiglia.	M.		
ri	In lire una, $\frac{10}{400}$.	250 0	8	80·	80·400	79·600	Savoja.					Lilla.	W.		
	In cent. 50, $\frac{4}{400}$.	100 0	6	30·	30·150	29·850	0 2,72·222 (B.)	2 45							
	In cent. 25, $\frac{4}{400}$.	100 0	8	40·	40·200	39·800	Francia.			0·05					
	In lire due, $\frac{8}{400}$.	100 0	6	15·	15·108	14·892	0 1,66·666 (B.)	1 50							
ri	In lire una, $\frac{10}{400}$.	250 0	8	20·	20·140	19·860									
	In cent. 50, $\frac{5}{400}$.	125 0	6	7·500	7·575	7·425									
	In cent. 20, $\frac{1}{400}$.	25 0	16	16·	16·160	15·840	Spese di fabbricazione al chilogramma (N).								
							Li. 1	Cts. 10							
ri	In cent. 3, $\frac{33}{700}$.	785 73	(K.)				1	37							
	In cent. 1, $\frac{45}{700}$.	642 85					3	09							
			10	100·	101·	99·	0	92	1 50 (per ogni L. 100/m.)	† 14· ?					
	In cent. 5, $\frac{250}{700}$.	4,000 0	10	50·	50·500	49·500	1	32							
ri	In cent. 2, $\frac{35}{700}$.	500 0	10	20·	20·300	19·700	2	24	1 0 (come-sovra.)	18· ?					
	In cent. 1, $\frac{35}{700}$.	500 0	10	10·	10·150	9·850	3	24		22· ?					

· ogni coppia di conii.

Quanto poi alle speciali annotazioni concernenti a' rispettivi luoghi come sovra distinti colle lettere (A), (B), (C), (D), (E), &c., vennero esse, pel più vole riferimento e confronto, estese a parte, nell' apposito fascicolo annesso al presente quadro.

Torino, dall' Amministrazione Centrale delle Reale Zecche, addì 17 Giugno 1856.

L'Amministratore in Capo,
Intendente Generale,
CATTANEO

No. 31. Sardinia.

Sig. Cattaneo.

ANNOTAZIONI al QUADRO SINOTTICO di PARAGONE fra l'attual DECIMALE MONETAZION de' REALI STATI, e quella dell' IMPERO FRANCESE.

(A) L'oro e l'argento recati al cambio nelle zecche nostre pagansi a' portatori sul peso in fino, cioè ragguagliato al titolo di 1,000; e nelle Francesi sul peso in lega a ragion del titolo. De' quali due metodi, sebbene conducenti ad un medesimo risultamento, stimasi preferibile il primo; perchè più semplice, e perchè il prezzo è, per ambi gli stati, prefisso pel metallo nobile (ch' è il sol ogetto del cambio ossía compera), e non per l'unitovi rame, od altro ignobil metallo, di cui non è a pro de' venditori tenuto verun conto.

(B) Nella Tabella Francese (Colonna I.) alla periodica frazione di 5, è men propriamente surrogato il forzamento del secondo 5 in un 6. La qual decimale periodica frazione di 5, come quelle di 2, di 4, e di 6 nella Colonna X., volte in precise frazioni volgari, danno esattamente $\frac{5}{9}$, $\frac{2}{9}$, $\frac{4}{9}$, e $\frac{6}{9}$, di centesimo rispettivamente.

(C) Il bronzo monetabile constar dee, giusta la relativa Legge, di 950 millesime parti di rame, 40 di stagno, e 10 di zinco.

(D) Li divari nel valor reale delle monete Francesi d'oro e d'argento, fra la tabella anzidetta, ed il presente Quadro, Colonna II., consistono meramente nell' essersi in quest' ultimo, a miglior dimostrazione, spinto il computo fino ai cento-millesimi di lira, mentre in quella fu limitato ai dieci-millesimi, forzandoli però d' 1, ove la residua frazione eccedeva li 5 cento-millesimi, e negligendola ove non eccedea.

Le differenze poi nello stesso real valore tra esse monete Francesi, e le Sabaude, provengono dall' essere in Francia minore, che da noi, il montar della ritenuta per le spese di fabbricazione, sul prezzo dell' oro e dell' argento da pagarsi a' portatori, siccome scorgesi dalle Colonne I. e X., e colà è minore la ritenzione, perchè più lievi generalmente sono le spese negli stabilimenti di maggior lavoro. Quind' il real valore, di cui quì ragionasi, calcolato (sotto cotal diffalco) a ragione del giusto peso indicatosi nella Colonna VI., è il valor relativo al cambio, ma non l'assoluto, che perfettamente uguale per Savoja e per Francia riesce, in quanto ciascuna specie è pei due stati identica di titolo e di peso, dai quali due dati dipende il valore intrinseco d'ogni moneta; e dicesi identica pur di peso, abbenchè la Legge assegnante il peso giusto per le specie nostre abbiane, quanto alle due prime in oro, ristretta l'enunciazione alla 3ª cifra frazionaria, cioè ai milligrammi, e per la terza specie alla 4ª cifra, vale a dire ai dieci milligrammi; giacchè poi il reale lor peso, in ambi gli stati, dee (salve le tolleranze) rispondere al prescrittone rispettivo taglio di 31, di 62, e di 155, al chilogramma. Della testè mentovata restrizione di peso alla 3ª, o 4ª cifra frazionaria nelle nostre prime tre specie d'oro non tennesi conto nè pel peso medesimo, nè in conseguenza nel computare il detto real valore; perchè la provegnentene diminuzione, non aggiugnente a due dieci-millesimi di lira, avrebbe sol valuto a vieppiù complicare il presente Quadro, costituendo essa una diversità di nessunissimo effetto pratico, stante la somma esiguità dove trattisi d'uno o pochi pezzi individualmente, e lo scomparir ch' ella fa ove si calcoli in massa, pel motivo già di sopra indicato, e maggiormente svolto alla Nota (I).

(E) La Legge assegnò, per la specie da centesimi 3 in rame, il taglio a chilogramma in 166 pezzi rotondamente; quandochè, a 6 grammi il pezzo, rileva realmente a $166\frac{2}{3}$; ma nelle fabbricazioni e contabilità relative seguesi tal precisa ragione, che il meno (siccome il più) non ammettesi, fuorchè a causa e ne' limiti delle stabilite tolleranze. Del resto è quì opportuno il notare, come non è guari, avendo la Francia da riconiar l'intera massa delle ignobili monete, ha saggiamente colto siffatta opportunità, per far iscomparire dal suo monetario sistema l'unica specie (quantunque non abbiane mai battuto) la qual fosse disforme dal nuovo decimal metodo, com' è appunto la moneta da centesimi 3.

(F) A tre fra le specie in oro, ed a tre fra quelle in bronzo è statuito un modulo d' 1 o 2 millimetri superiore a quello delle corrispondentivi specie nostre in oro, ed in rame. La dimension però del secondo d'essi diametri risultando bastevole a' fini suoi, stimerebbesi men conveniente lo ampliarla in pareggiamento al primo, sì perchè il rame è men duro che il bronzo, e men resistente all' attrito, sì perchè, in qualunque serie, e specie (a condizioni nel resto uguali) la logorabilità d'una moneta è in ragion diretta della ampiezza del modulo.

(G) Il titolo pel bronzo non è punto l'espressione di sua finezza, qual si è il titolo per l'oro e per l'argento; ma la semplice espression della unità del complessivo suo peso (grammi o millesimi 1,000) in quanto debbonsi alla medesima ragguagliare li tre parziali pesi de' componenti metalli, cioè grammi o millesimi 950 di rame, 40 di stagno, e 10 di zinco, a' quali poi si riferiscono le tre rispettive tolleranze, in più ed in meno, accennate nella Colonna VII. Poichè di poco o niun pro, e di troppa spesa e difficoltà riuscirebbe in pratica lo stabilire per codesti ignobili metalli, l'individual titolo propriamente detto, bastando il prescrivere, che sieno di prima qualità, malleabili, ed atti al monetamento; siccome praticossi per le Sabaude monete in rame, le quali non eran nè anche suscettive dell' improprio titolo anzidetto e relativa tolleranza, siccome conflate, non d'una lega metallica qual è il bronzo, ma d'un metallo solo.

Relativamente poi a' due nobili metalli, non v' ha tra le moneti di Savoja e di Francia niuna differenza sul titolo, e niuna altra sull' analoga tolleranza in più ed in meno; fuorchè il non essersi appo noi ridotta da' 3 ai 2 millesimi quella per le specie in argento; le quali già da più anni deggiono colà essere, quanto le specie in oro, d'un titolo nè inferiore ad 898 millesimi, nè superiore a 902; quandochè appo noi basta tuttora, non iscendano a men di 897, nè salgano a più di 903. Della quale maggior tolleranza per l'argento, nella nostra monetazion conservata, fu ed è motivo la ben più esatta e rigorosa verificazione del titolo, che in esso metallo si eseguisce per via umida, e non già a volume, assai più intricato e men cauto metodo, ma sì a peso con bilancie apposite e accuratissime, mentre in sull' oro si opera ovunque per via secca, cioè a coppella; e son anche ragioni per conservarla tuttavía la ben lieve entità della cosa (perdita o lucro di circa 22 centesimi a chilogramma in legal monetabile, e così, a scudo, di men che 6 millesimi di lira), le gravi difficoltà di questa più precisa fabbricazione, ed il minor rigore che fors' è usato ne' saggi Francesi; oltrechè poi, ad aggravare in ciò la condizion degli appaltatori, sarebbe stato e sarebbe forza, a ogni modo, lo aspettar l'accasione d'un nuovo appalto.

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(H) Venendo a ragionare dell' individual peso al pezzo, in ciascuna serie, e dal peso giusto incominciando, già nella Nota (D) accennossi, che quello spettante alla serie in oro si è nel presente quadro inscritto qual trovasi nella Tabella Francese, anche per le specie Sabaude, spingendolo fino alla 5ª cifra frazionaria, benchè la Legge nostra soffermisi per le prime due specie alla 3ª, e per le altre alla 4ª cifra ; ed in tal forma operossi, dacchè sostanzialmente non ne avviene in pratica nessuna diversità. Pel che sarà non inopportuno lo aggiugnere, a maggior chiarezza, come da noi (nè altrimente avverrà in Francia) sia d'uso ne' pesamenti a pezzo, che la frazione, oltre la 3ª cifra esprimente i milligrammi, si forzi ad 1 milligramma intero qualor superi 5 dicci-milligrammi, e non superandoli si abbandoni, qualmente accade pel valore, quanto alla frazione oltre la 2da cifra, ch' è dei centesimi. Ma per l'opposto, se trattisi delle monetarie operazioni e calcolazioni a chilogramma ed in massa, la ragion prevalente si è il prefisso taglio, che per l'oro essendo, rispettivamente, di 31, 62, 155, 310, e (quanto a Francia) 620, ogni millegrammi di materia in lega, ne deriva, che in ciascuna specie tal numero di pezzi dee (salve le statuite tolleranze) esattamente equivalere al chilogramma, svanendo per ciò la differenza in meno, imputabile al limitar come sovra la frazione alla 3ª o 4ª cifra, ovvero alla 5ª ; che per conseguenza sul complesso riguadagnasi codesta limitazione (qualmente pur l'indicato abbandono o forzamento) peculiare all' individual peso ; ch' essa limitazione, se alla 5ª cifra, importerebbe, sul menzionato rispettivo numero, per le prime due specie 14, e per la 3ª 45 cento-milligrammi, e ad ognuna delle due altre 2 milligrammi, in meno del chilogramma, e se alla sola 3ª o 4ª cifra, produrrebbe per tutte le specie un meno di 2 milligrammi egualmente; che, togliendo ad esempio la specie da L. 20 in valor nominale, il riguadagno di siffatto meno, secondochè sia di 45 cento-milligrammi, o di milligrammi 2, e supponendo ben inteso, che la lega sia a giusto titolo, fa salire il valor monetario del pezzo (il valor cioè della materia insieme e del lavoro) da L.19 99·9991, oppur da L.19 99·9960, a 20 lire precisamente, ed il real valore pel cambio, ossía prezzo da pagarsi a' cambiatori per la materia (puro oro) e perciò diffalcate le spese di fabbricazione in L. $8{\cdot}44\frac{4}{9}$, se da noi, ovvero in L. $7{\cdot}44\frac{4}{9}$, se in Francia, da L.19 95·67,652,130, a L.19 95·67,741,935$\frac{15}{31}$ rispetto a quest' ultima, e, quanto a noi, da L.19 95·0,927,840, oppur da L.19 95·0,958,764 (secondochè si chiuda il computo del peso alla 4 delle cifre frazionarie, come nella tariffa Sabauda, od alla 5ª giusta la Tabella Francese, ed il presente Quadro) a L.19 95·0,967,741,935$\frac{15}{31}$, recando il peso all' intera sua matematica esattezza, la qual è di grammi $6{\cdot}451{,}612\frac{25}{31}$, pesar dovendo il pezzo da L. 20. $\frac{1}{1555}$ del chilogramma ; e che in fine codesta precision di peso, tranne il più od il meno per la legal tolleranza, qual già si disse, riceve pratica applicazione quand' operasi in massa. Donde pur si raccoglie, che, mentre nel valore pel cambio il divario fra li due stati è cosa esigua, l'assoluto real valore della moneta d'oro, non men che di argento, è il medesimo in Francia e da noi ; che vi è, qual debb' essere, pari al valor nominale o legale, perchè il valor d'una merce qualsiasi naturalmente e giustamente consta non solo del prezzo della materia, ma eziandío, se lavorata, del prezzo d'opera ; e che le spese di fabbricazione non aggiungono, nemmen per gli Stati Sabaudi, ad $\frac{1}{4}$ per 100 del valore quanto alle specie in oro, e quanto a quelle in argento ad $1\frac{1}{4}$ per la Savoja, nè a più di $\frac{3}{4}$ al 100 per la Francia.

(I) Or passando a dire del peso individuale sì abbondante sì scarso, e perciò delle relative tolleranze in più ed in meno, e queste tanto al pezzo quanto al chilogramma, si osserverà primieramente, che nella Tabella Francese il peso abbondante e lo scarso del pezzo in oro da L. 20, veggonsi annotati ad un cento-milligramma in meno di quanto s'inscrissero nella presente, e di quanto in fatti risultano aver ad essere, eseguendo la detrazione od aggiunta, al giusto peso, de' grammi 12·90, ch' è la quota colà della tolleranza al pezzo indicatavi per tale specie. Il che, riguardando alla esattezza d'espressione fino a tal cifra per le altre specie usatavi, non saprebbesi guari ascrivere ad altro, che a mero equivoco ; siccome lo è senza dubbio il vedervisi accennato, pel pezzo in argento da 20 centesimi, il peso scarso in 999 milligrammi, quandochè non può essere se non di 990. A cagion della grand' esiguità del pezzo Francese in oro da L. 5, si dovè ampliarne eccezionalmente la tolleranza sul peso dai 2 a' 3 millesimi, pareggiandola a quella dello scudo in argento.

Del rimanente nelle tolleranze sul peso a chilogramma, sussiste per tutte le specie nelle due nobile serie perfetta parità fra li due stati. Che se nella terza serie avvi differenza non solamente ne' pesi, ma ben anco nelle ammessevi tolleranze, ben minori per le Francesi monete in bronzo, che per le Sabaude in rame (per cui si dedusse la quì espressa tolleranza a peso da quella che la Legge prefisse a numero sul taglio, come pur ebbesi da far per la specie in argento da centesimi 25), è ciò ascrivibile alla ben maggior precisione, che in Francia ordinossi d'usare in coniando queste nuove comunque ignobili specie, al precipuo scopo di contrapporre tutta la possibile difficoltà all' ingente lucro che il contraffarle offrirebbe, mentr' esse in real valore, computatavi pur largamente ogni qualsiasi spesa, non arrivan nè anco alla metà del nominale. Finalmente non saprebbesi per la serie nostra in rame additar causa, per cui sulla minima delle tre specie abbiavi la tolleranza medesima che sulla maggiore, e sia superata dalla tolleranza sulla specie media.

Riguardo poi alla tolleranza sul peso al pezzo, essa corrisponde esattamente a quella per chilogramma, eccettuatene le specie in oro, e la moneta nostra da centesimi 50 in argento. Quest' ultima, a 7 grammi per 1,000, importa la tolleranza di milligrammi 17.50, qual è prefissa a codesta specie in Francia ; nè si conosce il perchè siasi alla nostra assegnata in 18 milligrammi, veggendosi per le altre monete ammesso ove occorre il mezzo milligramma, ed anco il quarto. Ma, relativamente alla serie in oro, vuolsi avvertire, che la tolleranza a chilogramma dell' 1 sul 1,000 per le prime due specie, del 2 per le due susseguenti, e del 3 per la quinta Francese, in matematica precisione importerebbe, sull' esattissimo peso del pezzo, quanto alla 1ª specie, grammi $0{\cdot}032{\cdot}25\frac{25}{31}$, e metà rispetto alla specie 2ª ; grammi $0{\cdot}012{\cdot}90\frac{10}{31}$ riguardo alla 3ª, e metà per la 4ª ; e grammi $0{\cdot}004{\cdot}83\frac{37}{31}$ sull' ultima; che nella Tabella Francese la tolleranza al pezzo non si diparte dalle mentovate precissime quote, se non se col forzare all' intero, oppur col negligere la frazione ch' è oltre i cento-milligrammi, secondochè sorpassi o no li 5 millionigrammi, mentre nella Sabauda monetazione è dalla Legge limitata, per le due maggiori specie, ai milligrammi soltanto, e per la terza, e la quarta è spinta pure ai cento-milligrammi, ma ritenutili fissamente

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nel solo novero di 50 e di 25 rispettivamente, e così alla metà soltanto ed al quarto d'un milligramma; de' quali due metodi il nostro è più acconcio alla possibile pratica applicazione, senza dar luogo a sensibile scapito per l'Erario, o pel pubblico.

In fatti la tolleranza a chilogramma, osservata infin almeno alla 6ª delle frazionarie cifre decimali (i millionigrammi), è usata nelle operazione e contabilità di zecca per le partite in massa; nelle quali nulla vieta, ch' essa impieghisi, ed in cui riuscir può rilevante, più o meno, la somma delle frazioni anche al di là dei cento-milligrammi. All' opposto la tolleranza al pezzo non pare utilmente estendibile, fuorchè a metà o quarto di milligramma al più, rotti questi già men agevoli a render concreti per via di campioni e di pesamenti; talchè una maggiore teorica accuratezza, per l'ordinario, tornerebbe praticamente inattuabile e vana. Così la tolleranza al pezzo sulla moneta da L. 20 fu presso noi statuita di soli grammi 0·012·50. Tali sono i motivi delle differenze, che scorgonsi fra le due sorta di tolleranza; differenze però di niun momento, poichè, all' addotto esempio attenendoci del pezzo da 20, in valor monetario rileva a L. 0·00·125, ossía $\frac{1}{8}$ di centesimo, ed in material valore, a poco meno, cioè a L. 0·00·124,693$\frac{17}{31000}$; il che a nulla monta, trattandosi di tolleranza a pezzo, e non in massa.

Codesta diversità nella tolleranza al pezzo tra l'inscritto nella Tabella Francese, e lo stabilito appo noi, cagiona le differenze che rilevansi fra l'uno stato, e l'altro, negl' individuali pesi abbondante e scarso; se non che poi in pratica è, pel già spiegato riflesso, applicabile in genere ad essi pesi, in ambe le monetazioni, ed anche per l'argento, il già detto nella antecedente Nota (H) circa l'individual peso giusto; vale a dire che la frazione, oltre la cifra de' milligrammi, suolsi forzare al milligramma intero, ovver negligere, secondochè sia o no maggiore della metà d'un milligramma; norma questa istessamente usata ne' complessivi pesi, giusto, abbondante, e scarso (per amendue le serie, e sì per la Francia sì per Savoja) rispetto a' 6, 8, o 16 pezzi, che ad ogni fabbricazione prelevansi pel saggiamento (come nella Colonna IX.) fra le quali tre sorta di pesi complessivi, la 2ª e la 3ª offron pure, a proporzione, le differenze medesime, e per la medesima causa, che li corrispondentivi pesi individuali. (V. però le speciali osservazioni contenute nella Nota (L).

(J) Il poco bisogno e poco uso appo noi de' piccioli pezzi in oro intermedi fra la moneta da L. 20 e quella da 5 in argento, e all' opposto il molto bisogno ed uso dei piccoli pezzi in argento per le minute contrattazioni, e pe' saldi e resti, mezzani fra li rilevanti a uno scudo, e li pagabili con danaro di rame, dimostrano quì preferibile il metodo in pratica, d'una molto più tenue ragione che non in Francia, per gli spezzati in oro, e d'una assai maggiore per quelli in argento; la qual è pari alla prefissa nella monetazion Francese, ed anzi per lo Stato Sabaudo, ne' primi anni almeno, sarebbe insufficente, se già o più non avessimo in circolazione un 14 millioni d'erosomisto, fra terraferma e Sardegna.

Nulla è or assegnato pel summultiplo da centesimi 25 in argento, poichè da lungo tempo mandò l'amministrativa autorità sospenderne la fabbricazione.

Quanto poi alle proporzioni sì degli spezzati co' rispettivi interi, sì dell' una coll' altra specie d'essi spezzati nella serie Sabauda in rame, e nella Francese in bronzo; se la ragione dei tre summultipli nella 2ª è più che tripla di quella dei due summultipli nella 1ª; e vice versa, ove si paragonino li due della 1ª con solo i due inferiori fra li 3 della 2ª, il complesso degli uni supera di $\frac{3}{7}$ il complesso degli altri; se questi in entità si pareggiano, mentre quelli diversificano tra loro di circa $\frac{1}{5}$; ed infine se ciascuna delle due specie di spezzati erosi eccede d'oltre metà od un quarto la omologa sua (prossimiore od uguale) in bronzo: imputar vuolsi al non essere appo noi, tuttora provvisti di ragguardevole quantità di biglione (in ispecie inferiori a quelle da 50 e da 25 centesimi d'argento), abbisognata in rame, ragguagliatamente a popolazione, la quantità di moneta alla Francia occorrente; al non aver paruto e non parere opportuno lo introdur quì di nuovo l'abolita specie da centesimi 10; al formar invece lo intero in tal serie il cinque centesimi; ed al costituir esso nuovo eroso, insiem coll' antico, e col biglione anzidetto, una somma, non che pari ad $\frac{1}{7}$ della coniazione in bronzo dalla Francia ordinata, ma sì rilevantene a circa $\frac{2}{5}$: alla qual diversità di circostanze tornava connaturale una diversità di proporzioni e ripartimenti.

Nè sull' oggetto della Colonna VIII. altro rimane a soggiugnere, trannechè la prefission de' rapporti pei summultipli dipendere, in ambi gli stati, da' provvedimenti dell' autorità, che sovrintende al monetario servizio; giacchè, generalmente parlando, sconverrebbe lo statuirli per legge, e così renderli per ogn' altro modo immutabili.

(K) Il divario nel numero de' pezzi pel saggio, tra le zecche nostre e le Francesi, quanto alle specie d'argento, riesce di nessuna importanza, non potendo influire a maggior sicurezza e precisione il prelevamento all' uopo di otto o sedici in luogo di sei monete. Il che dipende dall' usare in Francia, ch' una metà de' pezzi ritengasi appo la commissione, rimettasi l'altra all' uficio di saggio, e vi operino due soli saggiatori, non anche il verificatore come appo noi, restando una metà per gli straordinari ulteriori saggiamenti in caso di notevole discrepanza fra li due ch' eseguirono l'ordinaria verificazione; sicchè da ultimo, con men quantità di pezzi, meglio guarentita parrebbe l'operazione appo noi, avendovi sempre il giudicio di tre, in luogo di due soltanto.

Riguardo poi alla verificazione delle Sabaude specie in rame, lasciossi alla amministrazion delle zecche il far prelevare, ad ogni fabbricazione, quel numero di pezzi, che avrebbe giudicato opportuno a tal uopo.

(L) Li complessivi pesi delle quantità di pezzi prelevabili pe' saggiamenti essendo conteggiati su' pesi individuali, a pezzo cioè per pezzo, inscritti nella Colonna VI.; a quelli ugualmente concernono le spiegazioni e avvertenze già per questi datesi nelle Note (H) ed (I), anche riguardo alle differenze, che ne' complessivi pesi abbondante e scarso rilevansi fra le monete di Savoja e di Francia, come pure alla regola, in pratica, di poi recare al milligramma intero, oppur trascurare le frazionarie cifre al di là della 3ª, secondochè oltrepassino o no la metà del milligramma.

Quanto però alle specie di Francia in oro da L. 20 e da 10, ed in argento da L. 2, furono sul presente quadro emendate, siccome ascrivibili a mero equivoco, o meglio ad error di copia, le indicazioni date nella Tabella Francese,—

1°. Del peso giusto in grammi 38·710 per la 1ª specie, e dello scarso in grammi 19·316 per la 2ª; poichè, a differenza degli altri pesi notative fino ed inclusivamente alla 5ª

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frazionaria cifra, vi si sarebbon essi limitati alla cifra de' milligrammi, seguendo per quei due soli pesi la testè menzionata regola di forzamento od abbandono.

2°. Del peso abbondante nella 1ª e nella 3ª delle dette specie, rispettivamente inscrittovi di gramnfi 38·790, e di grammi 80·440; quando ch' essi non salgono fuorchè, l'uno a 38·787, oltre una tenue frazione che, in qualsiasi ipotesi di calcolo, non aggiugne a 5 dieci-milligrammi; e l'altro ad 80·400 esattamente.

3°. Del peso scarso nella 1ª specie, espressovi in soli grammi 38·630; mentre, in qualsiasi ipotesi di conteggio, egli supera d'alcun che 38·632.

(M) La Francia andò riducendo la quota di ritenzion per le spese di monetazione dell' argento e dell' oro, insino a L. 1·66⅔ a chilogramma per l'uno, ed a 6·66⅔ per l'altro, in vista, come già si disse, non solamente dei risparmi nel costo, cui procacciarono a codesta lavorazione i progressi notevoli delle fisiche scienze, in chimica specialmente ed in meccanica, l'applicazion del vapore, proficua ove molta sia l'opera e non discontinua, e lo arredamento degli opifici in quante ed ottime, comunque dispendiose, macchine abbisogni; ma assai più di tutto a cagione dell' incessante più o men grande copia di lavoro: mentre il diffettare appo noi delle tre ultime condizioni, fra cui la precipua che alla entità del lavoro concerne, divietò il diminuirla a volta nostra di più che a L. 2·72⅔, ed 8·44⅔.

Ma essendosi da quel Governo ravvisato opportuno lo aggiugnere alla serie dell' oro una 5ª piccolissima specie, il 5 lire, di ben disagevole e costosa fabbricazione, poichè la spesa del coniare cresce coll' impicciolire, siccome scema coll' ingrandir de' pezzi; riconosciuto inoltre com' eziandío per la monetazion consueta e precipua, ch' è della specie da L. 20, da sè isolatamente considerata, l'additatasi riduzione avesse alcun che di troppo, e si dovesse la peculiare analoga ritenuta computare in rialzo a L. 6·77⅞, quella peculiare alla moneta da L. 10 fosse da calcolarsi a 9·55⅝, e l'altra per la nuova da 5 lire a 14·72⅔; non fatto caso dell' altre due specie da L. 100, e da 50, pel non uso, o per la rarità e pochezza di lor battiture; e altronde statuite le ragioni dell' entità de' coniamenti da farsi ne' mentovati summultipli da L. 10, e da 5, colla total entità della monetazione, e rimpetto alla quantità da battere in ispecie da 20 lire: sovr' esse ragioni di due, d'uno, e di diciassette ventesimi, come alla Colonna VIII. (mentre non puossi, per le nobili monete, tassare la rifazion delle spese in quota diversa per ciascuna specie, ma forza è regolarla in unica quota comune all' intera serie) trovossi aver ad ascendere l'accomunata ritenzione per l'oro a poco più di L. 7·45; e così da 6·66⅔ fu aumentata a 7·44⅘; onde poi il real valore pel cambio, a rotonda somma tornando com' è da noi, vi riuscì di L. 3437. Siccome però libero al Governo serbar voleasi l'acconsentire, e occorrendo prescrivere, a seconda delle circostanze, anche una restrizione alle suddette proporzioni per gli spezzati in oro; e, a ragion del meno che annualmente se ne coniasse, rimasto sarebbe all' appalto un indebito lucro, di altronde impossibile restituzione ai cambiatori stessi: venne prestabilito, che, per ogni chilogramma di meno in pezzi da L. 10, e da 5, sarebbero a quelle finanze sborsate L. 9·55⅝ e L. 14·72⅔ rispettivamente.

Il tutto è quì calcolato a peso in fino quale usa da noi; e non in lega al titolo di 900 giusta il costume di Francia.

(N) Nel confronto delle quote di mercede per le spese di fabbricazione delle nostre decimali specie in rame, battutesi pressochè interamente ne' primi anni del nuovo monetario sistema, con quelle che importò alla Francia la sua serie in bronzo, non sarà inopportuna lo accennare.

Ch' esse quote furono prefisse per convenzione, le seconde coi Direttori delle Zecche per la totalità delle operazioni dal punto di consegna, a lor mani, della materia, consistente nelle anteriori ignobili specie al cambio richiamate; e le prime con un appaltatore a privata trattativa, ed a unico accomunato prezzo, per la somministranza della materia e lavorazion sua, fino ed inclusivamente all' imbianchimento de' tondini, e coi Direttori delle Zecche per la sola operazion della battitura, a prezzo vario per ciascuna delle tre specie, siccome fecesi dall' Amministrazion Francese:

Che perciò, ad instituire il paragone fra le mercedi d'appalto dell' una serie e dell' altra nelle singole specie loro, le due quote pel Sabaudo eroso riunironsi, previo diffalco, dalla prima, dell' allora corrente prezzo del rame nella pattuitane qualità, e la ripartizione del resto fra le tre specie, proporzionalmente alle quantità coniate in ciascuna, e al determinatone prorata nella seconda quota:

E che la diversità di tempo, e di circostanze, ma principalmente quella gravissima della ragion d'importanza, tra l'appalto nostro ed il Francese, che fu d' 1 a più di 9, rilevando a un dipresso la materia monetabile pel 1° appalto a poc' oltre li 500,000 chilogrammi, e pel 2do a poco men di 5,000,000; spiegano abbastanza il come le spese della monetazion nostra in rame presentino una notevole eccedenza su quelle del coniamento in bronzo per l'altro stato, detrattane la quarta ed infima specie, del peso d' 1 solo gramma, e la più dispendiosa: la qual eccedenza sul complesso delle tre altre specie da grammi 10, da 6 (o 5), e da 2, nell' una serie a rimpetto dell' altra, riesce fra $\frac{1}{12}$ e $\frac{1}{13}$, sommando l'accomunato prezzo per chilogramma di coniato a pressochè L. 1·25 nella serie nostra, e a quasi L. 1·16 nella Francese.

(O) La ritenuta sul valor dell' oro e dell' argento, per le spese di monetazione in Francia (ritenuta costituentevi come da noi la rifazione e mercede pel Direttore) comprende pure il costo di verificazione, ed il prezzo de' conii vario per ispecie di moneta, ed il montar delle ghiere spaccate, regolati entrambi a ragion d'uso come in questa colonna, e le ghiere scanalate, il cui rilevare è fermato non d'uficio, ma d'accordo fra le parti, e quant' altr' occorra al coniare; sicchè ghiere, conii, &c. sono a carico del Direttore che li paga all' Incisor Generale, come ne lo è il costo della verificazione da sborsarsi al commessario, ond' egli retribuir possa gli argenti, cui fa trasportare, pesare, e numerare i tondini, ed i pezzi coniati. Quandochè appo noi nulla costa la verificazione, siccome direttamente eseguita da uficiali stipendiati, e nulla i trasporti, che si effettuano da operai del Direttore stesso; le ghiere continue, sì scanalate, sì liscie (non avendovi uso di spaccate) provveggonsi dal Direttore, gli costano per coppia lire 15, e regger possono a maggior servigio che le spaccate; son pure a spesa di lui li cuscinetti pel cordonare a liscio i tondini, importano per coppia L. 10, e durano lunghissimamente: li cuscinetti poi a cordonamento inscritto, ed i conii vanno

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Sig. Cattaneo.

a carico dell' Amministrazione, e, dopo collandati, pagansi agl' incisori in ragione, non della quantità di pezzi battuti, ma di ciascuna coppia in L. 25 e 40 rispettivamente; lungo consimilmente a quel delle ghiere si è l'uso de' cuscinetti inscritti ; e quanto a' conii, la media loro durata eccede fors' anco gli 800, 266⅔, 200, e 100 chilogrammi rispettivamente di battuto, che, a centesimi 5, 15, 20, e 40 rispettivamente, darrebbono appunto 40 lire : il qual nostro metodo però meglio adattasi alla condizione di men lavoro in cui trovansi le zecche nostre a petto delle Francesi, talchè troppo a lungo avrebbono gl' incisori ad aspettarne la mercede.

Ed il simile è pur a dire circa la infima serie delle monete d'ambi gli stati, in quanto che la retribuzione a' Direttori, per le spese di fabbricazion secondo la specie, include in Francia, oltre le ghiere liscie, ed i lisci cuscinetti come da noi, anche il carico della verificazione, e l'onere de' conii, &c., cui la Sabauda Amministrazione, ugualmente che per le nobili specie, dee di proprio fornire ; se non che il prezzo de' conii pel bronzo Francese venne stabilito non ad uso, qual pe' nobili metalli, ma, istessamente che per tutte le serie delle nostre monete, a coppia; prezzo però progredente colà da L. 14, a 18, ed a 22, giusta la specie, e quì unico, a tutte comune, in L. 25 ; del quale ben maggior costo allegabili sono le medesime cause già svolte nella precedente nota sulla mercede co' Direttori convenuta per tal fabbricazione.

(P) Per quanto consti all' Amministrazione, la Zecca di Cagliari non ebbe segno di sorta, siccome unica nella Sardegna avente, fino a questi ultimi tempi, una monetazione affatto diversa da quella di terraferma. Tale opifizio poi da moltissimi anni più non è in esercizio, e può aversi per abolito, sicchè rimangono le sole due zecche continentali, ab antico erette, e dalla straniera dominazione non tolte, cui questo regno possiede nella propria capitale, come l'ha ogn' altro stato, e nella seconda di sue città; necessaria l'una, anche perchè la sola idonea per qualsiasi ingente operazion monetaria, ed importante pur l'altra, perchè al commercial emporio di Genova, assai più che non a Torino, affluisce il cambio de' preziosi metalli, e con essi la quantità del lavoro.

Riguardo poi alle altre ovver più estese notizie e spiegazioni, che sull' oggetto del presente Quadro si desiderassero, veggasi l'unito scritto, contenente le risposte a' quesiti della Commissione Britannica sulla Decimal Moneta, nella parte specialmente che al 3° punto concerne del quesito 36°.

L'Amministratore in Capo, Intendente Generale,
CATTANEO.

Torino, dall' Amministrazione Centrale delle Reale Zecche,
Li 17 Giugno 1856.

Sardinia.

M. Despine.

NOTE sur les QUESTIONS relatives aux MONNAIES, POIDS, et MESURES transmises au soussigné par la Légation d'Angleterre.

1. LE territoire des Etats Sardes se compose de plusieurs parties, dont l'aggrégation a eu lieu à différentes époques. Au moment de la première Révolution Française il comprenait sur le continent la Savoie, le Piémont, le comté de Nice, les provinces détachées de la Lombardie. Il comprenait en outre le territoire de l'Ile de Sardaigne.

Monnaies.

2. Les provinces continentales avaient toutes le même système monétaire. La monnaie de compte à laquelle se rapportait la monnaie effective était la livre de Piémont, dont le rapport légal au franc ou à la livre actuelle est 100 pour 118¾ ; cette livre se subdivisait en 20 sols, et le sol en 12 deniers. Seulement dans les provinces du Novarais ou détachées de la Lombardie on se servait généralement dans les transactions privées de la livre Milanaise (valant en francs ou livres neuves 0·768), et les comptes se fesaient presque tous avec cette monnaie.

3. Le système monétaire des provinces continentales avait été spécialement fixé par l'Edit du Roi Charles Emmanuel III. sur la monétisation, en date du 15 Février 1755, lequel prescrivait la refonte successive des anciennes monnaies, et ordonnait d'en frapper de nouvelles, comme suit :—

Monnaie d'Or.

	Poids.	Valeur.
Doppia nuova	deniers 7 12 6	ls. pt. 24 0 0
Mezza	3 18 3	12 0 0
Quarto	1 21 1 12	6 0 0

Monnaie d'Argent.

Scudo nuova	27 10 23	6 0 0
Mezzo	13 17 11 12	3 0 0
Quarto	6 20 17 18	1 10 0
Ottavo	3 10 8 21	0 15 0

Erose.

	Valeur.
Pezza di 7½ soldi	ls. pt. 0 7 6
„ di 2½ „	0 2 6
„ di 1 „	0 1 0
„ di 2 denari	0 0 2

Un Brévet Royal du 28 Juin de la même année autorisa, en outre, de frapper les multiples en or, dits,—

	Poids.	Valeur.
Carlino, 5 doppie	37 13 6	120 0 0
Mezzo carlino, 2½	18 18 15	60 0 0

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Le 30 Décembre 1785 le Roi Victor Amédée III. publia un nouvel Edit, qui apporta quelques variations dans les proportions des matières, et les monnaies ci-dessus furent réduits :—

Monnaie d'Or.

	Poids.	Valeur.
Pezza da 5 doppie	deniers 35 14 4	120 0
„ da 2½ „	17 19 2	60 0
Doppia nuova	7 2 20	24 0
Mezzo	3 13 10	12 0
Quarto	1 18 17	6 0

Monnaie d'Argent.

Scudo nuovo	27 10 23	6 0
Mezzo	13 17 11 12	3 0
Quarto	6 20 17 18	1 10
Ottavo	3 10 8 21	0 15

Par trois autres Edits rendus en 1794 le même Souverain ordonna le 4 Janvier 1794 de frapper de nouvelles pièces, eroso-misto, de 15 sous ; le 14 Février 1794 de frapper des pièces de 5 sous ; le 14 Mai 1795 de retirer les pièces en cours de 7½ sols et de 15 sous, et de les remplacer par de nouvelles pièces, eroso-misto, 20 sous, et de 10 sous.

4. La Sardaigne avait son système monétaire particulier. Les titres différents auxquels ces monnaies avaient été battues déterminèrent le Roi Charles Emmanuel à les réformer par son Edit du 26 Mars 1768. Elles se rapportaient à la lira Sarda, monnaie de compte non frappée, dont le rapport légal au franc ou à la livre actuelle est 1·92, laquelle se divisait en 20 sous, et le sous en 12 deniers ; elles se composaient des monnaies suivantes :—

Monnaie d'Or.

	Poids.	Valeur.
Carlino	deniers 12 12 20	l. s. 25 0 0
Mezzo carlino	6 6 10	12 10 0
Doppietta	2 12 4	5 0 0

Monnaie d'Argent.

Scudo	18 10 0	2 10 0
Mezzo scudo	9 5 0	1 5 0
Quarto scudo	4 14 12	0 12 6

Monnaie d'Argent titre inférieur, Eroso-miste, Cuivre.

	Valeur.		Valeur.
Reale	l. s. 0 5 0	Mezzo soldo	l. s. 0 0 6
Mezzo reale	0 2 6	Cagliarete	0 0 2
Soldo	0 1 0	Denaretto	0 0 1

5. Telle était la condition monétaire des Etats Sardes lors de la première Révolution Française. A mesure que les provinces continentales furent envahies, le Gouvernement Français y introduisit son système monétaire, soit le système décimal. Le Novarais fit partie du royaume d'Italie, où fut introduit le même système, en sorte que l'Ile de Sardaigne, restée seule sous le sceptre de la Maison de Savoie, fut la seule aussi dont le système monétaire n'eprouva pas de variations.

6. Lors de la Restauration en 1814 les provinces continentales furent rendues à a Maison de Savoie. L'Edit du 21 Mai 1814, qui remettait en exécution les royales constitutions et toutes les dispositions émanées jusqu'au 23 Juin 1800, portait entre autres Article 5 : "Vogliamo che niente si innovi in ordine al corso attuale delle monete."

L'Instruction du Bureau Général des Finances du 24 Mai, et les Manifestes Caméraux des 28 Septembre, 27 Octobre, et 5 Décembre de la même année, en assurèrent l'execution et prescrivirent le frappage de doppie, de mezzo scudo, et de pièces de 2½ sous.

7. La Ligurie ayant été réunie aux Etats Sardes, une Délégation Royale fut nommée par Patentes du 30 Décembre 1814, pour l'administrer provisoirement. Il y fut dit, Article 10 :—

"Le monete d'oro e d'argento dell' antico stato Genovese attualmente correnti ed esistenti saranno ricevute nelle casse pubbliche, unitamente alle monete Piemontesi."

La monnaie de compte était, la lira de 20 sols 12 deniers chacun, *valuta di banco*, dont le rapport au franc est 1·0368, mais devenue hors d'usage depuis la suppression de la banque de St. Georges. La lira de 20 sols 12 deniers, *fuori banco*, dont le rapport usuel au franc est 0·83⅓, ou 120 lira pour 100 francs.

GENOA.

Les monnaies effectives étaient :—*Monnaie d'Or.*

	Poids.	Valeur.
Doppia di Genova	deniers 22 22	ls. pt. 96 0 0
Metà		48 0 0
Quarto		24 0 0
Ottavo		12 0 0

Monnaie d'Argent.

Scudo	30 6	8 0 0
Metà		4 0 0
Quarto		2 0 0
Ottavo		1 0 0
Sedicem		0 10 0
Terzo di lira		0 6 8

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Monnaie de Billon.

Pezza da soldi	10 abusivi	-	-	-	0	5	0
„ da	5 „	-	-	-	0	2	6
Parpaiola -	-	-	-	-	0	1	4
Cavallotto -	-	-	-	-	0	2	8
Prouetta da	8 denari	-	-	-	0	0	8
„ da	4 „	-	-	-	0	0	4

Par Manifeste Caméral du 8 Janvier 1816, il fut prescrit d'ajouter dans l'écu de Savoie l'arme de Gènes avec le titre de Duc de Gènes.

8. Le système monétaire de toutes les provinces continentales fut entièrement réformé par le Billet Royal du 6 Août 1816, les Lettres Patentes des 17 Septembre 1816, et 4 Décembre 1820, et par les Manifestes Caméraux des 12 Août 1816 et 9 Décembre 1820. Par ces dispositions la monnaie de compte fut la *lira nuova* de Piémont, égale au franc, et il fut stipulé qu'à l'avenir tous actes et contrats seraient passés en lires neuves, multiples ou sous-multiples ; qu'en outre, les monnaies à frapper seraient :—

Monnaie d'Or.

Doppia nuova l. n.	20	155 par kill.	900 mills de fin,	2 mills tollérance.	
„ -	40	77½ „	„	„	„
„ -	80	38¾ „	„	„	„

Monnaie d'Argent.

Ecu - -	5	40 „	„	3	„
„ - -	2	100 „	„	„	„
„ - -	1	200 „	„	„	„
„ - -	0·50	400 „	„	„	„

Le 16 Janvier 1826 le retrait des pièces de 7½ sols (15 sous) fut ordonné. Le 22 Mars un autre Manifeste Caméral fixa la réduction des livres anciennes en livres neuves avec 18¾ per cent. d'augmentation, c'est-à-dire 100 livres anciennes pour 118¾ livres neuves.

Le 26 Octobre de la même année parut l'Edit Général sur la Monétisation, qui déclara qu'à l'avenir les monnaies décimales auraient seules cours légal ; que les contrats devraient être stipulés dans cette monnaie, sous peine de 50f. d'amende ; que le scuto de Genova et ses fractions cesseraient d'avoir cours ; qu'il serait frappé des pièces de 0·25, 0·05, 0 03, et 0·01.

Les Manifestes Caméraux des 26 Mars et 30 Octobre 1829 prescrivirent le retrait des pièces de 2 sols 2 deniers, des soldini, des mezzi soldi, et des petites monnaies Génoises.

Enfin les Lettres Patentes et le Manifeste Caméral des 29 Mai et 18 Juin 1832 ordonnèrent de cesser la fabrication des pièces d'or de 80f. et de 40f., et d'y substituer de nouvelles pièces de 100f., 50f., 20f., et 10f.

D'après ce qui précède, les monnaies de terre-ferme en cours sont :—

Denominations.	Valeur.		Poids.				Titre en Mills.
			Ancien.			Décimal.	
Or.	L.N.	Cent.	D.	Gr.	Granotti.	Gr. Mill.	
Nouvelles.							
Pièces de 100	100	0	25	4	13	32 258	900
„ 80	80	0	20	3	16	25 806	„
„ 50	50	0	12	14	07	16 129	„
„ 40	40	0	10	1	20	12 903	„
„ 20	20	0	5	0	22	6 451	„
„ 10	10	0	2	12	10	3 225	„
Anciennes.							
Doppia di Savoie - -	28	45	7	2	20	9 116	905
Metà - - -	14	22½	3	13	10	4 558	„
Quadruplo di Genova - -	79	0	19	16	12	25 214	909½
Ses fractions ½, ¼, ⅛ en proportion.							
Argent.							
Nouvelles.							
Ecu de 5	5	0	19	12	12	25 000	900
Pièce de 2	2	0	7	19	10	10 000	„
„ 1	1	0	3	21	17	5 000	„
„ 0·50	0	50	1	22	20	2 500	„
„ 0·25	0	25				1 250	„
Anciennes.							
Ecu vieux de Pt. - -	7	10	27	10	23	35 164	904
Ses fractions (½, ¼, ⅛), en proportion							
Eroso.							
Nouvelles.							
Pièce de 0·05	0	5	3	21	17	5 000	
„ 0·03	0	3	2	8	5	3 000	
„ 0·01	0	1	0	18	18		
Anciennes.							
Pièce de 8s. (20s.)	0	40					
„ 4	0	40					

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9. Quant à la Sardaigne, qui avait conservé ses anciennes monnaies (§ 4), l'Edit de Monétisation du 26 Novembre 1842 établit que depuis le 1er Janvier 1843 la livre neuve de Piémont serait la seule unité légale, et fixa en rapport avec elle le tarif de toutes les monnaies en cours dans la même île, d'après le tableau suivant :—

Denomination.		Valeur.		Poids.					Titre en Mills.
				Ancien.			Décimal.		
		L.N.	Cent.	Deniers.	Grains.	Granotti.	Grms.	Millgrs.	
Or	Carlino	50	0	12	12	20	16	053	891
	Mezzo carlino	25	0	6	6	10	8	026	„
	Doppietto	10	0	2	12	04	3	210	„
Argent	Scudo	4	80	18	10	0	23	587	895
	Mezzo scudo	2	40	9	5	0	11	793	„
	Quarto di scudo	1	20	4	14	12	5	897	„
Eroso-misto	Reale	0	48						
	Mezzo reale	0	24						
Rame	Soldo	0	10						
	Mezzo soldo	0	05						
	Cagliarese	0	01						
Monnaies décimales en cuivre :									
Pezza da 5 centesimi		0	05	3	21	17	5		
„ da 3 „		0	03	2	8	5	3		
„ da 1 „		0	01	0	18	18	0		

10. Les détails qui précèdent font connaitre les phases successives qu'a subies le système de monétisation dans les diverses provinces qui composent les Etats Sardes. Ils me paraissent répondre à l'ensemble des questions posées par le Gouvernement Anglais, questions auxquelles il serait assez difficile de répondre isolément.

En prenant toutefois chacune de ces questions par ordre de numéro, on peut dire que :—

Q. 1. Quelle est la monnaie de compte actuellement etablie par la loi?——

R. Que la monnaie de compte adoptée aujourd'hui partout est la livre ou franc, la seule légale.

Q. 2. Quelles sont les subdivisions de cette monnaie de compte?——

R. Que ses subdivisions et multiples qui forment la monnaie effective sont données, § 8.

Q. 3. Se sert-on, dans le fait, de plus de deux dénominations de monnaie pour exprimer ou pour noter les paiements et les recettes ; et quelles sont ces dénominations?——

R. Qu'il n'y a pas différentes dénominations pour noter les paiements et les recettes.

Q. 8. Trouve-t-on que les plus petites monnaies dont on se sert habituellement soient incommodes par suite de leur valeur trop ou trop peu élevée ; et quelles classes de la société se ressentent de ces inconvénients?——

R. Que, par suite du retrait des anciennes petites monnaies de billon, celles actuelles sont facilement acceptées par toutes les classes de la société.

Ancienne Monnaie de Compte ou Effective.

Q. 9. Quelle était la monnaie de compte avant l'introduction du système actuel ; et quelles en étaient les subdivisions?——

R. Que les monnaies de compte anciennes sont énoncées aux § 2, 3, 4, 7.

Q. 10. Quelle en était la valeur légale par rapport à la monnaie de compte actuelle?——

R. Que leur valeur légale par rapport à la monnaie actuelle est donnée par les §§ 8 et 9.

Q. 11. Dans l'ancienne monnaie de compte quelles étaient les pièces ayant cours, et quelle en était la valeur?——

R. Que les anciennes pièces en cours sont indiquées aux § 3, 4, 7.

Changement de Monnaie.

Q. 12. A quelle époque s'effectua ce changement?——

R. Que le changement de monnaie en celle actuelle est donnée aux §§ 8 et 9.

Q. 13. Quelle en a été la cause?——

R. Qu'il fut dû aux habitudes contractées sous l'occupation Française, et aux avantages reconnus d'un système monétaire uniforme.

Q. 14. A-t-il été amené par suite d'inconvénient, de confusion, ou de complexité dans l'état de l'ancienne monnaie ayant cours?——

R. Même réponse.

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Q. 15. Y avait-il dans les anciennes monnaies des inconvénients inhérents à la valeur des unités principales ou subordonnées, ou dans leurs proportions relatives ?——

R. Même réponse.

Q. 16. S'aperçut-on des inconvénients qui amenèrent ce changement en payant ou recevant de l'argent, ou dans la tenue des comptes ?——

R. Même réponse.

Q. 17. Pour le cas où de tels inconvénients se seraient fait sentir, sur quelles classes de la société pesèrent-ils le plus sensiblement ?——

R. Même réponse applicable à toutes les classes de la société.

Q. 18. Jusqu'à quel point ce changement fut-il causé par le désir d'assimiler la monnaie à celle des pays limitropes, et le public s'était-il déjà en partie familiarisé avec la nouvelle monnaie comme monnaie de compte ou d'échange avant qu'elle ne fût étable par une loi ?——

R. Même réponse. Sans doute que les nombreux rapports avec la France y ont beaucoup contribué.

Q. 19. Ou est-ce plus tôt et jusqu'à quel point qu'on l'avait adopté à raison d'une préférence abstraite pour une division décimale d'argent sur une division non décimale ?——

R. Même réponse.

Q. 20. Comment ce changement s'effectua-t-il ?——

R. Le changement s'est effectué par les dispositions législatives indiquées §§ 8 et 9.

Q. 21. Changea-t-on les valeurs relatives de quelques-unes des monnaies ayant cours auparavant ?——

R. Il n'y a pas eu de changement dans les valeurs, sauf dans les pièces *erosomisto* de 15 sous et de 20 sous, et de 10 sous, réduites en 1814, d'après leur valeur intrinsique, à $7\frac{1}{2}$ sous, 8 sous, et 4 sous.

Q. 22. A-t-on émis de nouvelles monnaies, et lesquelles, en vue de ce changement, avant, simultanément, ou après ?——

R. Les nouvelles pièces en cours sont données § 8.

Q. 23. Retira-t-on de la circulation quelques-unes des anciennes monnaies, et permit-on à quelques-unes des anciennes monnaies, et lesquelles, de circuler simultanément avec les nouvelles ?——

R. Les pièces retirées de la circulation sont indiquées au § 8.

Q. 24. Donna-t-on d'anciens noms aux nouvelles monnaies ou de nouveaux noms aux anciennes ?——

R. On a donné aux nouvelles monnaies des dénominations analogues à leurs similaires en France. Les anciennes ont conservé leurs noms.

Q. 25. Les anciennes monnaies de compte de dénomination inférieure étaient-elles commensurables entre les nouvelles, et pouvaient elles s'exprimer exactement par ces dernières ?——

R. Le rapport des anciennes aux nouvelles monnaies est indiqué au § 8.

Q. 26. Pour le cas où elles ne pussent être exprimées exactement l'une par l'autre, quelle provision fit-on pour le payement de dettes contractées sous l'ancien système et lesquelles devaient être acquittées sous le nouveau ? Ou dans le cas de péages fixes, comme barrière, droits, &c. appartenant à des particuliers, à des corps municipaux, ou à l'Etat, lesquels auraient été acquis sous l'ancien système, ou en fin pour tout autre obligation fixe ?——

R. La loi a déterminé les rapports des anciennes aux nouvelles monnaies, et tous les officiers publics ont dû se conformer à ces tarifs.

Q. 27. Le changement dans la monnaie de compte se fit-il graduellement ou à une seule fois ? Etait-ce facultatif ou obligatoire ? Et dans ce cas, comment et par quelles pénalités le mit-on en exécution ? Réussit-on à le faire adopter généralement ? ou l'ancien système continua-t-il en usage pendant quelque et pour combien de temps en comptes ou dans les discours du peuple ?——

R. Le changement s'est opéré d'après les dispositions énoncées § 8. Il a été facilement adopté partout. Seulement dans les pays frontières, notamment dans le Novarais, l'usage de se servir de la livre Milanaise est encore très repandu (0·768) ; mais il tend peu à peu à disparaitre.

Q. 28. Le changement étant facultatif, l'ancien et le nouveau système continuèrent-ils à exister à coté l'un de l'autre pendant quelque temps, et existent-ils encore conjointement ?——

R. Les anciennes et nouvelles monnaies ont continué encore plusieurs années simultanément, mais aujourd'hui, à part l'exception du Novarais, et peut-être de la Ligurie, on se sert généralement des nouvelles.

Q. 29. S'est-on aperçu de quelques inconvénients, et lesquels, de ce double emploi, et quel effet exerce-t-il sur les comptes, les billets de banque, et les lettres de change ?——

R. Il ne parait pas en être résulté des inconvénients dans les opérations de banque et de change.

Q. 30. Avec ce système de double emploi, de quelle manière se tiennent les livres des négociants et banquiers ?——

R. Les livres des banquiers se tiennent généralement en monnaie courante légale.

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Q. 31. Le changement s'est-il opéré complètement, ou quelles classes de personnes et dans quelles parties du pays continuent-elles à se servir des anciennes dénominations en parlant ou dans la tenue des comptes?——

R. Le changement s'est opéré assez facilement, et sans froisser aucune classe.

Q. 32. Ce changement était-il impopulaire au moment ce son introduction, et auprès de quelles classes de la société; et cette impopularité était-elle passagère ou non? Existe-t-elle encore? Le changement a-t-il été cause de tumultes ou de perturbation populaire?——

R. Il n'a causé aucune perturbation populaire, et a été accueilli généralement avec facilité.

Q. 33. La nouvelle monnaie est-elle plus ou moins commode que l'ancienne, et quels en sont les avantages ou les désavantages?

1°. En payant ou recevant,—(*a*) De fortes sommes. (*b*) De petites sommes.

2°. Pour la tenue des comptes—(*a*) Dans les grosses affaires. (*b*) Dans les petites affaires.

A. La nouvelle monnaie établie sur le système décimal est certainement plus commode, tant pour les gros que pour les petits paiements, tant pour les forts marchés que pour ceux peu considérables.

Poids et Mesures.

L'uniformité des poids et mesures dans toutes les parties des Etats Sardes a été le but constant de la préocupation de la Maison de Savoie.

Par Edit du 5 Juin 1612, le Duc Charles Emmanuel I. prescrivit cette uniformité dans les 11 provinces (610 communes) qui composaient le Piémont, et où existaient plus de 300 poids et mesures différens. Des tables de réduction furent alors dressées à cet effet. Les nouvelles mesures dont les étalons furent déposés à la Chambre des Comptes étaiént:—

Mesures de Longueur:—
- Le trabucco divisé en 6 pieds liprands.
- La pertica de 2 trabucchi.
- Le piede liprando de 12 onces.
- Le piede manuale de 8 onces.
- L'oncia de 12 punti.
- Le raso pour les étoffes de 14 oncie.
- La tesa pour le bois, le foin de 5 piedi manuali.

Mesures de Superficie:—
- La giornata de 100 tavole.
- La tavola di 4 trabucchi quadrati.
- Le piede di 12 oncie.
- L'oncia di 12 punti.
- Le punto di 12 atomi.

Mesures de Solidité:—
- Le trabucco cubo pour carrières, fossés, &c.
- La tesa cuba pour puits.
- Le trabucco quadro de 10 oncie pour les murs.

Poids:—
- Poids de marco.
- Le rubbo de 28 libbre.
- La libbra di 12 oncie $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ libbra.
- L'oncia di 24 denari.
- Le denaro de 24 grani.

Mesures de Capacité pour Matières Sèches et Liquides:—
- Le carro de 60 raps.
- Le carro de 12 brente pour le vin.
- La brenta de 36 pintes.
- La pinta de 2 boccali.
- Le boccale de 2 quartieri.

Mesures de Capacité pour les Grains et autres Denrées.
- Le carro de 6 sacchi.
- Le sacco de 3 staia ou 6 emines.
- L'emina ou $\frac{1}{2}$ staio.
- La $\frac{1}{2}$ emina ou quartaro.
- La $\frac{1}{4}$ „ ou doppio coppo.
- La $\frac{1}{8}$ „ ou coppo.
- Le $\frac{1}{16}$ „ ou semi coppo.
- Le $\frac{1}{32}$ „ ou biscudella.
- Le $\frac{1}{64}$ „ ou scudella.
- Le $\frac{1}{192}$ „ ou coppetto cucchiarino.

Les Rois Victor Amedée II. et Charles Emmanuel III., par leurs dispositions des 24 Mai 1727 et 26 Septembre 1749, ordonnèrent de conformer les poids et mesures des provinces du Piémont aux étalons déposés à la Chambre des Comptes; et déclarèrent aussi vouloir étendre le même système à toutes les provinces de la monarchie; mais les événemens politiques ne leur permirent pas de complèter cette réforme.

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12. Lorsque le Gouvernement Français voulut réformer son système de poids et mesures le Gouvernement Sarde fut invité en 1798 à envoyer ses étalons du pied liprand et de la livre de Piémont, avec des commissaires pour concourir dans la Commission de l'Institut à fixer l'unité fondamentale. Ce fut d'abord le Comte P. Balbo, puis l'Abbé Vassali-Eandi, que désigna à cet effet l'Académie des Sciences.

La valeur du pied liprand (0,^{m}51376597) et celle de la livre de Piémont (0,^{k}368844508) y furent déterminées par verbaux du 14 Floréal et du 2 Messidor, an 7.

13. Toutes les provinces continentales ayant été successivement réunies à la France, il y fut introduit le système métrique. Toutes les dispositions émanées en France y furent aussi promulguées. Des Commissions Spéciales furent nommées dans chaque département pour publier des tables de réduction ; mais la difficulté de réunir les élémens nécessaire n'ayant pas permis d'y apporter toute l'éxactitude nécessaire,la révision de ces tables avait été commencée lorsque les événemens de 1814 et 1815 vinrent tout-à-coup les interrompre.

14. A la Restauration, un Billet Royal du 8 Août 1815 remit en vigueur les anciennes dispositions relatives aux poids et mesures dans toutes les provinces continentales.

Après la réunion de la Ligurie, la Chambre des Comptes fit procéder officiellement au rapport à établir entre les poids et mesures de ces nouvelles provinces avec les poids et mesures du Piémont.

15. Le piede liprande devint ainsi la mesure légale ; mais sur la proposition faite le 19 Mai 1818, par l'Académie des Sciences, la longueur de ce pied fut altérée pour être mise en rapport exact avec l'arc du méridien, sous le nom de piede Piemontese, et tous les autres poids et mesures furent également réformés d'après ce nouveau prototype. Ainsi il fut admis que :—

1°. L'arc du méridien entre l'equateur et le pôle serait 19,440,000 piedi Piemontesi.

2°. Le cube de $\frac{1}{3}$ piede Piemontese ou 4 onces de côté, égal à 64 onces, eau distillée a 4° température, serait la livre.

3°. L'émine serait 750 onces d'eau distillée.

4°. La brenta serait 1604 onces d'eau distillée.

16. Toutefois le Règlement des Ponts et Chaussées du 29 Mai 1817 maintint l'emploi du système métrique Français pour tous les travaux publics.

Le Manifeste Caméral du 14 Mars 1818 le rendit applicable à l'administration des douanes ; les Lettres Patentes du 3 Avril 1819 l'étendirent à la fixation des dimensions des tantes de roues.

17. Les applications partielles étaient un acheminement à l'uniformité des poids et mesures pour laquelle la Royale Chambre des Comptes, dans les attributions de laquelle se trouvait le service, avait été chargée de préparer les matériaux. A cet effet, elle avait dès le 28 Mai 1827 nommé une commission pour véifier les étalons de chaque commune, proposer ceux à supprimer ou à maintenir, dresser des tables exactes de rapport ; mais dans les propositions qu'elle soumit au Gouvernement, celle-ci se borna à un système de transition destiné à rapprocher du système décimal métrique sans trop les varier, les mesures usuelles de chaque province.

Le Gouvernement n'agréa pas cette proposition, et, par Billet Royal du 24 Novembre 1832, il la chargea de préparer un tableau exact de réduction de tous les poids et mesures usuels en poids et mesures métriques.

18. L'Ile de Sardaigne, qui se trouvait régie par une administration et des lois spéciales, sentait aussi le besoin de reformer son système de poids et mesures, de même qu'elle avait déjà réformé son système monétaire.

Par Edit du 1er Juillet 1844 l'uniformité des poids et mesures fut établie à partir du 1 Janvier 1846. Le système décimal métrique fut rendu obligatoire pour toutes les administrations publiques. Les anciennes mesures furent tolérées pour les particuliers, mais seulement en voie transitoire, et rapportées néanmoins en quantités décimales entières. C'était déjà un grand pas, en tenant compte surtout des nombreuses difficultés qu'éprouve en Sardaigne l'introduction de nouvelles institutions. Cependant l'exemple de la France, et la mauvaise réussite du Décret Impérial du 12 Fevrier 1812, aurait dû faire pressentir l'inconvénient de semblables demi-mesure de tolérance.

19. Enfin l'Edit du 11 Septembre 1845 a définitivement fixé toutes les hesitations en prescrivant l'adoption pure et simple du système métrique Francais dans toutes les parties de la monarchie Sarde, à partir du 1er Janvier 1850. Par cet Edit remarquable, rendu sous le ministère de M. Des Ambrois, la direction de tout le service a été transféré de la Chambre des Comptes au Ministère de l'Intérieur. Il y a été ordonné que des étalons seraient déposés aux archives de la Chambre des Comptes, aux Bureaux Provinciaux d'Intendance, dans les chefs-lieux de mandement et dans tous les bureaux de vérificateurs des poids et mesures ; qu'en outre des tables de réduction seraient dressées et publiées, que tous les officiers publics devraient, dans les actes et marchés, se servir exclusivement des poids et mesures métriques, sous les peines y énoncées.

20. Le temps qui s'est écoulé entre la promulgation de cet Edit et l'année 1850 a été destiné à en préparer les moyens d'execution. Le même jour, 11 Septembre 1845, une Inspection Supérieure a été créée, par Brevet Royal, pour régir ce service sous la direction du Ministère d l'Intérieur. Une Commission des Poids et Mesures a aussi été nommée, soit pour dresser les tables de réduction et les divers réglements, soit pour vérifier les étalons, soit pour donner son avis sur toutes les questions techniques.

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Une visite générale de toutes les provinces et de tous les bureaux de vérification a été faite pour assurer sur tous les points une marche régulière, pour y connaitre l'état de la fabrication, et pour apprecier la consistance à donner au matériel de chaque bureau, matériel au sujet duquel la loi du 6 Octobre 1849 a ouvert un crédit de 150,000f.

Des traités élémentaires ont été imprimés par les soins du Gouvernement, et répandus par milliers d'exemplaires. Dans toutes les écoles communales l'enseignement du système métrique a été encouragé, et rendu obligatoire, en y joignant des modèles. Enfin, des instructions suffisantes ont éte données pour que tous les assujettés qui vendent au public fussent munis des poids et mesures métriques à l'époque fixée.

21. En exécution de l'Edit du 11 Septembre 1845 ont été publiés successivement:—Le 6 Septembre 1848, le Règlement sur la Fabrication; le 30 Juin 1849, les Tables de Réduction; le 26 Mars 1850, la Loi pour la Vérification Première et la Vérification Périodique; le 8 Avril 1850, le Règlement Général de Service; le 8 Avril 1850, l'Extension à l'Ile de Sardaigne de l'Edit du 11 Septembre 1845; le 18 Avril, le Décret Ministériel classant les Industries assujettées à la Vérification; le 8 Mai, le Programme des Examens à subir par les Aspirans Vérificateurs.

Postérieurement ont été publiés quelques autres décrets relatifs à des dispositions spéciales que l'expérience a fait juger nécessaires, mais qui ne changent rien à l'essence des lois organiques qui précèdent. Je citerai cependant le Décret du 2 Novembre 1853, qui a supprimé l'Inspection Supérieure, et fondu l'Administration des Poids et Mesures, avec celles des contributions directes en conférant les attributions de l'Inspection Supérieure, partie à l'Administration Centrale, partie aux Directions d'Arrondissements.

22. Au moyen des dispositions qui précèdent, des instructions et circulaires partielles, on peut dire que le système décimal métrique se trouve aujourd'hui implanté sur tous les points de la monarchie. Dans aucun magasin ou lieu public on ne se sert, au moins ostensiblement, des mesures anciennes. Il arrivera bien certainement que des acheteurs demanderont fréquemment des objets en poids ou mesures anciennes, mais le vendeur le pèse ou mesure avec les poids métriques, sauf à le leur réduire en poids anciennes. Si l'autorité communale prêtait partout, un appui suffisant à l'exécution de la loi, notamment sur les places et marchés, tous les abus qui peuvent encore exister cesseraient bientôt.

23. Les détails dans lesquels je viens d'entrer sur les poids et mesures me paraissent satisfaire aux questions posées par le Gouvernement Anglais. Considérant toutefois chacune de celles-ci:—

Q. 34. Les poids et mesures sont-ils divisés d'après le système décimal? Et cette division décimale précéda-t-elle, accompagna-t-elle, ou suivit-elle la division décimale de la monnaie; ou n'y eut-il aucune relation entre les deux?

R. La division des poids et mesures est évidemment d'après le système décimal Leur introduction a suivi, longtemps après, l'adoption des monnaies décimales.

Q. 25. S'ils ne le sont pas, s'est-on aperçu d'inconvénients provenant de ce que la division des poids et mesures ne correspond pas à la division de l'argent?

R. On n'a pas reconnu d'inconvénients dans la différence entre la division des poids et mesures et la division des monnaies.

Q. 36. Comment reconcilie-t-on dans les affaires de détail des classes pauvres la division décimale de l'argent avec une division non-décimale pour les denrées. Ces classes sont-elles exposées par suite de ce système à des inconvénients ou à des pertes?

R. Les classes pauvres n'ont pas eu, que l'on sache, à souffrir de cette différence de division.

Q. 37. Veuillez ajouter tout autre renseignement que vous croisez utile, &c.?

R. L'exposé précèdent parait satisfaire à cette question.

DESPINE,

En-Inspecteur Supérieur des Poids et Mesures

Turin, le 10 Juin 1856.

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BELGIUM.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, so far as regards the KINGDOM OF BELGIUM, sent through HER MAJESTY'S MINISTER at BRUSSELS.

Monnaie de compte actuelle.

Q. 1. Quelle est la monnaie de compte actuellement établie par la loi?——

A. Le franc.

Q. 2. Quelles sont les subdivisions de cette monnaie?——

A. Le franc se divise en cent centimes.

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Q. 3. Fait-on usage de plus de deux dénominations pour la monnaie de compte, pour renseigner les paiements ou les recettes, et quelles sont ces dénominations ?——

A. Il n'y en a que deux, le franc et le centime, quelque grande ou quelque petite que soit la somme à exprimer.

Dans les calculs théoriques le système décimal permet de subdiviser le centime à l'infini.

Q. 4. Quelle est la valeur de la plus grande et de la plus petite unité de cette monnaie de compte estimée en monnaie du Royaume Uni ?——

A. L'or étant le seul étalon monétaire du Royaume Uni, et la Belgique n'ayant pas de monnaie d'or ni aucune valeur ou monnaie étrangère en or tarifée légalement, et l'argent n'étant en réalité en Angleterre qu'une monnaie fiduciaire que le Gouvernement seul peut faire frapper et émettre, il est impossible d'établir un rapport exact entre la valeur de la monnaie Belge et de la monnaie Anglaise.

Voici quelques données pour l'apprécier plus ou moins approximativement :—

Si l'on compare la valeur intrinsèque du franc, monnaie de circulation, à celle du shelling, monnaie telle qu'elle est fabriquée pour la circulation, le franc égale 10 pences $\frac{3\,9\,4}{1\,0\,0\,0}$, en comptant que 66 shellings pèsent une livre de troye au titre de $\frac{1\,1\,1}{1\,2\,0}$.

Si l'on calcule la valeur intrinsèque du franc en argent fin au prix de 62 pences que la monnaie de Londres paie généralement par once d'argent au titre de $\frac{1\,1\,1}{1\,2\,0}$ (standard), on trouve pour un franc 9 pences $\frac{6\,9\,9}{1\,0\,0\,0}$.

Si l'on considère le franc comme représentant la vingtième partie d'une pièce d'or de vingt francs de France, le franc comparativement à la livre sterling vaut alors de 9 pences $\frac{5\,1\,6}{1\,0\,0\,0}$ à 9 pences $\frac{5\,2\,5}{1\,0\,0\,0}$, en égard à la différence de tolérance qu'il y a en Angleterre et en France pour la monnaie d'or.

En égard aux changes, nous trouvons,

Qu'au change de francs	24·50	le franc vaut	9 pences	796	millièmes.
idem	24·80	„	9 idem	677	idem
idem	25·00	„	9 idem	600	idem
idem	25·50	„	9 idem	412	idem

Pour établir la valeur du centime, il faut prendre la centième partie de la valeur du franc.

Monnaies réelles circulant actuellement.

Q. 5. Quelles sont les pièces de monnaie légale en circulation générale, et quelle est leur valeur respective exprimée tant en monnaie de compte du pays qu'en monnaie du Royaume Uni, en faisant une distinction entre les monnaies d'or, d'argent, de cuivre, et de billon ?——

A. Aucune pièce de monnaie Belge ne porte un nom spécial ; toutes, sans aucune exception, ne reçoivent d'autres dénominations que celle de leur valeur réelle et légale, toujours parfaitement égale à leur valeur en monnaie de compte, de manière que leur énumération suffit pour constater leur valeur en monnaie de compte.

Quant à leur valeur en monnaie du Royaume Uni, on doit se référer à la réponse donnée à la question précédente. (4ème question.)

Monnaies d'or.

La Belgique n'a aucune monnaie d'or ; aucune monnaie d'or étrangère, ni aucun lingot d'or n'y a une circulation ou une valeur légale.

Monnaies d'argent.

Pièces de	cinq francs	pesant	25	grammes d'argent au titre de $\frac{9}{1\,0}$.	
idem	deux francs et demi	id.	$12\frac{1}{2}$	idem	idem.
idem	deux francs	id.	10	idem	idem.
idem	un franc	id.	5	idem	idem.
idem	cinquante centimes	id.	$2\frac{1}{2}$	idem	idem.
idem	vingt centimes	id.	1	idem	idem.

Les monnaies d'argent décimales Françaises ont toutes cours légal en Belgique pour la même valeur que les pièces Belges.

Les monnaies d'argent Hollandaises suivantes ont également cours légal en Belgique, savoir :—

Le florin des Pays-Bas pesant 10 grammes au titre de $\frac{9\,4\,5}{1\,0\,0\,0}$ fin, pour une valeur de deux francs dix centimes.

La pièce de deux et demi florins des Pays-Bas, pesant 25 grammes au titre de $\frac{9\,4\,5}{1\,0\,0\,0}$ pour cinq francs vingt-cinq centimes.

Ces deux pièces ne se rencontrent presque jamais dans la circulation.

Monnaies de cuivre.

Pièces de	10 centimes	pesant	20	grammes de cuivre pur.	
idem	cinq centimes	id.	10	id.	id.
idem	deux centimes	id.	4	id.	id.
idem	un centime	id.	2	id.	id.

Billon.

Il n'existe aucune monnaie de billon ou d'autre métal mélangé en Belgique.

Q. 6. La pièce de monnaie qui représente la plus petite unité monétaire de compte est-elle d'un usage général ?——

A. Oui ; sur un peu moins de deux cents millions de pièces de cuivre en circulation, il y en a près de quarante cinq millions en pièces d'un centime.

Dans quelques parties du pays on réclame encore avec instance plus de pièces d'un centime.

Q. 7. Quelle est la pièce de monnaie de la plus petite valeur d'un usage général ?——

A. Le centime. La pièce de deux centimes est cependant la pièce de peu de valeur la plus répandue et de l'usage le plus général. Dans la circulation réelle on la rencontre dans une proportion au moins triple de celle de un centime.

Q. 8. Se plaint-on de ce que la plus petite pièce d'un usage général soit d'une valeur par trop minime ou par trop élevée ?——De quelle classe de la société ces plaintes émanent-elles ?——

A. Non ; la valeur d'un centime, comme la plus petite unité monétaire, semble au contraire être acceptée aussi volontiers par le grand commerce que par le commerce de détail, et par le prolétaire aussi bien que par les classes les plus riches.

Ce qui le prouve encore, c'est que sous le système monétaire Néerlandais, où la plus petite monnaie de compte était le cent (valant deux centimes $\frac{1164}{10,000}$) on faisait frapper des demis cents, valant 1 centime $\frac{582}{10,000}$, ayant une circulation générale dans tout le pays.

Ancienne Monnaie de compte et ancienne Monnaie de circulation.

Q. 9. Quelle était la monnaie de compte avant l'introduction du système actuel ?——Quelles étaient ses subdivisions ?——

A. Lors de l'introduction primitive du système actuel en 1803, (car, supprimé en 1816 et remplacé alors par le système monétaire décimal des Pays-Bas, il fut rétabli en 1832), on comptait en Belgique au moins quatre monnaies légales de compte, toutes quatre d'un usage simultané, légalement et généralement admises.

1. La livre de gros, ou Flamande, qui se divisait en 20 schellings, chaque schelling valait 12 gros, chaque gros 8 deniers (penninghen), chaque pen ninghe 3 mittes (myten). Donc une livre de gros égalait 20 schellings, ou 240 gros, ou 1920 penninghen, ou 5,760 mittes.

Cette monnaie de compte servait principalement pour le calcul des changes étrangers.

On s'en est servi pour ce dernier usage, surtout pour calculer le change sur Londres à la bourse d'Anvers jusqu'à la fin de 1843.

2. Le florin de change, divisé en 20 sous de change, chaque sol en 16 deniers (penninghen).

C'est en cette monnaie de compte qu'était tenue la comptabilité des grandes maisons de commerce, et que se calculaient les changes sur Amsterdam et Hambourg.

3. Le florin de Brabant, ou courant, divisé en vingt sols de Brabant, chaque sol en douze deniers.

Dans les paiements journaliers on divisait le sol en quatre liards, monnaie réelle. C'était la monnaie de compte adoptée pour toutes les transactions de la vie usuelle.

Aucune de ces trois monnaies de compte, pas plus que deux autres moins usitées (la livre courante et le rixdaler) n'avait une seule monnaie réelle en rapport avec son unité.

Ces trois monnaies de compte existaient simultanément depuis des siècles. On en faisait usage simultanément dans les lois et ordonnances, &c.

Dans les actes hypothécaires, il était presque de règle de stipuler que la somme déterminée en florins de change, serait réduite à des florins courant de Brabant, en cas de paiement exact à l'échéance fixée.

Ces trois monnaies avaient une corrélation officielle fixée dès 1526. Une livre de gros valait 6 florins de change ou 7 florins courant.

4. La livre tournois, divisée en 20 sols de France ; chaque sol en 12 deniers.

C'était la monnaie de compte officielle depuis 1794, et la seule en usage dans tous les rapports avec le Gouvernment de cette époque et en général avec la France.

100 florins courant de Brabant valaient 183 livres tournois 13 sols $5\frac{3}{49}$, ou 181 francs 40 centimes $\frac{59}{100}$; ou en florins des Pays-Bas, 85 florins 71 cents $\frac{43}{100}$. 81 livres tournois valaient exactement 80 francs.

Il ne sera pas nécessaire de faire ressortir que, par suite du système suivi pour la vente des domaines nationaux, il y avait deux livres tournois différentes, l'une basée sur la monnaie d'or et d'argent, l'autre basée sur

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une tarification de diverses monnaies de papier dépréciées, ayant eu auparavant cours légal en France et forcé en Belgique.

A ces diverses monnaies de compte, il faut ajouter aujourd'hui, par suite de l'application transitoire du système Néerlandais.

5. Le florin du Pays-Bas divisé en cent cents.

On a cru devoir s'arrêter quelque temps sur ces diverses monnaies de compte, parceque, sauf la livre tournois, les quatre autres sont d'un usage encore journalier aujourd'hui. (Voir réponse aux questions Nos. 27 et 31.)

Q. 10. Quelle était la valeur légale de cette monnaie relativement à la monnaie de compte, actuelle?——

A. Une livre de gros, ou Flamande, valait 12 fr. 69 cent. $\frac{84}{100}$.

Un florin de change - -	francs 2·11	64 cents.
Un florin de Brabant - -	„ 0·85	71 „
Une livre tournois - - - -	„ 0 98	77 „
Un florin des Pays-Bas - - -	„ 2·11	64 „
La livre tournois pour achat de domaines à peu près	0·01	64 „

Q. 11. Quelles étaient les monnaies de circulation et quelle était leur valeur en monnaie de compte?——

On ne donne cette évaluation qu'en florins de Brabant, la monnaie de compte la plus usitée dans les transactions ordinaires, en faisant observer que 7 florins de Brabant valaient 6 florins de change, ou une livre de gros, ou six florins de Pays-Bas.

Valeur en Florins de Brabant assignée.

Date de l'Ordonnance qui règle la Fabrication.	Métal.	Espèces.	Lors de la Fabrication.	En 1794.	En 1810.
19 Septembre 1749	Or -	Double souverain -	17 17 0	18 12 9	18 12 $7\frac{74}{100}$
Idem - -	Or -	Souverain - -	8 18 2	9 6 $4\frac{3}{4}$	9 6 $3\frac{87}{100}$
19 Septembre 1749	Argent	Ducaton - -	3 10 0	3 11 2	3 9 $5\frac{49}{100}$
Idem - -	Idem -	Demi ducaton - -	1 15 0	1 15 7	1 14 $8\frac{75}{100}$
Idem - -	Idem -	Quart de ducaton -	17 6	17 $0\frac{1}{2}$	17 $3\frac{71}{100}$
Idem - -	Idem -	Huitième de ducaton -	8 9	8 9	8 7
19 Juillet 1755 -	Idem -	Couronne de Brabant -	3 3 0	3 3 0	3 1 $3\frac{58}{100}$
Idem - -	Idem -	Demi couronne Brabant	1 11 6	1 11 6	1 10 $6\frac{47}{100}$
Idem - -	Idem -	Quart couronne Brabant	15 9	- -	15 $2\frac{57}{100}$
1 Mars 1751 -	Idem -	Double escalin -	14 0	14 0	13 $2\frac{76}{100}$
19 Septembre 1749	Idem -	Escalin - -	7 0	7 0	6 $7\frac{33}{100}$
21 Avril - -	Idem -	Plaquette - -	3 6	3 6	3 6
19 Septembre 1749	Idem -	Pièce de 5 sous -	5 0	5 0	5 0
Idem - -	Idem -	Pièce de 10 liards -	2 6	2 6	2 6
Idem - -	Cuivre	Pièce de 2 liards -	6	6	6
Idem - -	Idem -	Pièce d'un liard -	3	3	3

Il y avait, en outre, quelques monnaies étrangères, comme le ducat Impérial, l'écu de Navarre (dite pièce de cinq plaquettes), qui avaient obtenu une tarification légale.

Les pièces de Liége, de Luxembourg, et de Limbourg étaient des monnaies provinciales, dont la valeur variait fréquemment.

Changement du Système Monétaire.

Q. 12. A quelle époque se fit se changement?——

A. 1. Le premier système décimal monétaire introduit en Belgique, était le système Français, rendu obligatoire pour la comptabilité publique par la loi du 17 Floreal an VII. (6 Mai 1799), et par décret du 26 Vendémiaire an VIII. (18 Octobre 1799.)

2. Le système décimal des Pays-Bas fut introduit par la loi du 28 Septembre 1816, et appliqué immédiatement à toutes les comptabilités publiques et particulières.

3. Le système actuel, qui est un retour complet au système décimal Français, fut décrété par la loi du 5 Juin 1832, et rendu obligatoire à partir du 1 Janvier 1833 pour tous les actes publics et administratifs.

Q. 13. Quelle était la cause de ce changement?——

A. Outre les changements politiques, les motifs principaux furent:

1. Pour le premier changement de mettre le système monétaire en harmonie avec le système décimal des poids et mesures décrétés par les lois des 30 Mars 1791, 18 Germinal an III. (17 Avril 1795), et 19 Brumaire an VIII. (10 Decembre 1799.) On partait dès-lors du même point pour fixer l'unité de mesure, celle des poids, et celle de la monnaie.

2. Pour le second changement la loi indique "d'une part la différence des "monnaies qui circulent dans les différentes provinces, ainsi que les "préjudices et les embarras qui en résultent, tant pour le trésor public "que pour les particuliers, surtout parceque plusieurs de ces mon- "naies ne peuvent nullement être considérées comme monnaies de "l'état, lequel ne peut tout au plus que les tolérer et les recevoir d'après "des tarifs déterminés; et d'autre part, les avantages que procurent à "l'état et aux sujets l'unité des monnaies et l'établissement d'un système "monétaire simple et regulier."

3. Le troisième changement fut légitimé par le désir de revenir aux principes d'unité du système décimal Français, et d'appliquer à mesurer la valeur le même point de départ qui détermine les dimensions ou les poids. On voulait aussi faciliter les relations commerciales très fréquentes avec la France.

Q. 14. Fut-il causé par quelques inconvénients, des confusions ou des complications dans l'état de la circulation antérieure?——

A. Incontestablement le premier changement mit fin à une complication des plus fâcheuses et à des embarras des plus grands; le second changement fut moins justifié sous ce point de vue, l'unité monétaire Française, aussi bien que le système décimal des poids et mesures, ayant été, au moins légalement, établi depuis des années dans toutes les parties du royaume des Pays-Bas.

Le troisième changement n'avait pour lui que le désir de revenir à l'unité primitive Française, et de faciliter les fréquentes relations avec la France.

Q. 15. Y avait-il dans la circulation antérieure des inconvénients inhérents à la valeur de l'unité principale ou des unités subdivisionnaires, ou bien dans les rapports de l'un et de l'autre?——

A. La valeur de l'unité principale, ou celle des subdivisions considérées isolément, n'ont jamais été invoquées comme devant motiver ou justifier un seul des trois changements introduits; mais il est incontestable que les rapports si variés envers les diverses unités de comptabilité usitées dans le pays avant la domination Française, ont contribué à généraliser dans les classes éclairées, et même à populariser sous quelques rapports, le système décimal introduit par ce Gouvernement.

Pour les deux autres changements, on répond négativement.

Q. 16. Les inconvénients qui ont provoqué ou facilité le changement de système, se sont-ils fait sentir dans les recettes et les paiements, ou dans la manière de tenir les comptes?——

A. Avant le premier changement, les inconvénients de toute nature se faisaient sentir, aussi bien sous le rapport de la comptabilité que sous celui de la circulation, et il serait difficile de dire de quel côté ils furent les plus sensibles. Pour les autres changements il faut répondre négativement.

Q. 17. Quelle classe de la société sentait le plus vivement ces inconvénients?——

A. Avant le premier changement, le commerce en général, mais surtout le grand commerce.

Quant à la classe pauvre, elle n'a pas bénéficié, et s'est soumise difficilement au premier changement. Elle a bénéficié par le second, en ce sens qu'elle recevait effectivement pour ses gages un cent là où autrefois elle avait soit un liard soit deux centimes (près de cinq pour cent de moins); et que, d'un autre côté, agissant par pression générale sur le détaillant, elle l'amena à introduire dans la vie usuelle la comptabilité en florins et cents des Pays-Bas, au lieu de celle maintenue jusqu'alors de florins et sols courant de Brabant.

Le troisième changement lui fut de nouveau défavorable aussi; quoiqu'existant depuis près de 25 ans, n'est-il pas généralement admis dans les boutiques, et au marché, et aux cabarets, où l'on compte presque uniquement en cents, et non en centimes. Il est vrai que l'usage, petit à petit, amené à faire perdre au mot "cent" sa signification primitive, et qu'aujourd'hui il a partout dans la vie usuelle la signification de deux centimes.

De manière qu'un franc se prend et se calcule chez tous les détaillants pour 50 cents et non pour 47 cents et quart.

On peut donc dire que le mot "cent" est aujourd'hui en Belgique, mais seulement dans les petites transactions, une monnaie de compte, valant deux centimes.

Q. 18. Le changement de système fut-il motivé principalement ou en partie par le désir d'assimiler la circulation à celle des pays voisins? S'il en a été ainsi, le peuple était-il familiarisé déjà avec la nouvelle monnaie, soit comme monnaie de compte, soit comme monnaie de change, avant qu'elle ne fût établie par la loi?——

A. Pour le premier changement, non. Pour le second, non. Car le florin des Pays-Bas, divisé en cents, était une création nouvelle et n'existant nulle part.

Pour le troisième changement, oui. Le législateur Belge a eu but avoué d'adopter le système monétaire Français, afin de faciliter les fréquentes relations entre ces deux pays.

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La nouvelle monnaie adoptée étant conforme au système Français, était devenue très familière par suite de la réunion de la Belgique à la France jusqu'en 1814.

Après cette époque, les monnaies Françaises d'argent ont continué à avoir cours légal dans les provinces méridionales du royaume des Pays-Bas (la Belgique).

Q. 19. Ou bien le changement fut-il amené uniquement ou partiellement par une préférence abstraite pour une division décimale sur une division duodécimale? ——

A. Pour le premier et le second changement, Oui, en très grande partie. La nouvelle subdivision du florin en cents, décrété lors du second changement, était uniquement justifiée par la préférence abstraite pour un système décimal.

Lors du troisième, le système décimal était déjà consacré par l'usage; les avantages de la théorie se confondaient ainsi avec les avantages de la pratique.

Q. 20. Comment le changement fut-il effectué?——

A. Lors du premier changement, on se borna à le décréter et à le rendre obligatoire pour les transactions publiques. Ce ne fut même que dix ans après, le 18 Août 1810, qu'on tarifa légalement les anciennes monnaies. Le système monétaire des Pays-Bas et le dernier système Belge établirent, lors de leur publication, et par la même loi, une tarification légale pour les monnaies existantes; et successivement les anciennes monnaies, qui circulaient en grande quantité, ont été démonétisées et retirées de la circulation.

Q. 21. Les valeurs relatives de quelques-unes des monnaies anciennes furent-elles changées?—

A. Chacun des trois systèmes amena un changement complet, sans toucher en rien à la valeur relative des anciennes monnaies tant qu'elles continuèrent à exister.

Q. 22. Dut-on émettre quelques-unes des monnaies nouvelles, en prévision du changement, avant, pendant, ou après le changement de système?——

A. Sous les trois systèmes on ne frappa de monnaies nouvelles que postérieurement à la promulgation et même à la mise à exécution de la loi, sauf qu'avant la promulgation, en 1799, de la loi monétaire en Belgique, la France avait fait battre, pour son usage, une certaine quantité de pièces d'argent et de cuivre, dont quelques-unes, mais fort rares, circulaient en Belgique.

Q. Retira-t-on de la circulation quelques-unes des monnaies anciennes, et lesquelles? Permit-on que quelques-unes des anciennes monnaies continuassent à rester en circulation conjointement avec les monnaies nouvelles?——

A. Lors du premier changement, on ne statua rien à l'égard des monnaies préexistantes, qui continuèrent à circuler et à être admises pour leur valeur relative, jusqu'en 1810, où on les tarifa officiellement. On ne retira de la circulation aucune des monnaies anciennes.

Lors du second et du troisième changement, les lois établirent officiellement les rapports entre la nouvelle et l'ancienne monnaie. En outre, le Gouvernement des Pays-Bas commença, et le Gouvernement Belge termina, la refonte complète de toutes les monnaies antérieures qui n'étaient pas fabriquées en conformité de la dernière loi.

Q. 24. Donna-t-on des noms d'anciennes monnaies aux pièces nouvelles, ou des noms nouveaux aux anciennes pièces?

A. Pour le premier changement, non. Lors du second changement, on conserva la dénomination de florin. On voulait aussi que la pièce d'un florin Hollandais, ou un florin de change Belge, représentât une valeur intrinsèque parfaitement égale aux nouveaux florins. "Le florin, comme "unité monétaire," dit la loi, "sera de la même valeur intrinsèque que "l'ancien florin frappé dans les provinces septentrionales."

Ceci était vrai en théorie, mais non en pratique, car il n'existait pas en circulation un seul florin ancien ayant la valeur assignée par la loi au nouveau florin.

Celà eut des conséquences assez graves. (Voir l'ouvrage cité de M. Vrolik.)

Lors du troisème changement on revient aux noms Français.

Sous aucun des trois changements on ne donna une nouvelle dénomination aux anciennes pièces.

Q. 25. La plus petite monnaie de compte ancienne était-elle commensurable par la nouvelle monnaie, et pouvait-on par elle exprimer exactement sa valeur?——

A. Non. Lors de l'introduction d'aucun des trois systèmes, la petite monnaie de compte immédiatement préexistante n'était exactement commensurable par la nouvelle monnaie. Ainsi, ni le sol, ni le denier de change ou courant, ni le gros ni la mytte, ne pouvait s'exprimer exactement en centimes, ni le centime en cents ou centième du florin, ni plus tard le cent en centimes.

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Q. 26. Si on ne pouvait exprimer exactement cette valeur, quelles dispositions prit-on pour le paiement des dettes contractées sous le système ancien? Que fit-on pour la perception de sommes déterminées,—par exemple: les droits de pont, péages, les contributions, &c., revenant à des particuliers, à des communes ou corporations, ou à l'état, lorsque ces perceptions avaient été fixées sous l'ancien système ou résultaient d'engagement d'un montant déterminé?——

A. Chaque système monétaire nouveau a été suivi ou accompagné d'un tarif établissant légalement la valeur des monnaies anciennes, tant de compte que de circulation.

Des lois ont également pourvu aux perceptions et aux paiements de sommes déterminées en fixant en nouvelle monnaie la plus rapprochée.

Par exemple : 1 liard pour 2 centimes.
„ 1 centime pour ½ cent.
„ 1 cent pour 2 centimes.

Il fut, en outre, toujours entendu que l'on négligerait, dans les paiements ou dans les réductions du total, la fraction définitive qui n'atteindrait pas la moitié de la plus petite unité monétaire, et qu'on porterait à cette unité les fractions supérieures à la moitié.

En strict droit, cependant, le payeur peut être contraint à se libérer exactement, et à supporter ainsi toutes les pertes des fractions.

Il est à remarquer, et l'on insiste sur cette remarque, que cet état de choses n'a pas donné, ni n'a pu donner, lieu à des inconvénients graves, parceque le calcul des réductions se fait jusqu'à la millième partie de la plus petite unité monétaire, tandis qu'on ne peut négliger les fractions que lors du paiement général de l'intégralité de ce qui est dû.

Q. 27. Le changement de la monnaie de compte fut-il graduel ou immediat? Fut-il facultatif ou obligatoire? S'il était obligatoire, comment et par quelles peines fut-il mis à exécution? Fut-il mis à exécution avec succès? Ou, est-ce que l'ancien système continua à être en usage pendant quelque temps dans les comptes ou dans le langage populaire?——

A. Le changement fut introduit immédiatement. Il fut obligatoire pour tous les actes des notaires, courtiers, tribunaux, et tous les actes publics, &c., sous peine d'amendes diverses; par exemple, pour les notaires cent francs par chaque contravention.

L'exécution ne souffrit pas de difficultés en ce qui concerne les actes publics et administratifs ; et quoique non obligatoire pour les actes tout-à-fait privés, on ne tarda pas à l'appliquer fréquemment, à en faire exclusivement usage pour tout acte ou piéce un peu importante.

Cependant aucun des trois systèmes ne réussit à se faire accepter généralement dans les rapports de la vie privée et dans les transactions usuelles.

Ainsi, aujourd'hui encore, on fait presqu' exclusivement en florins, sols, et deniers de Brabant toutes les ventes sur les marchés, tels que pour les grains, graines, lins, chauvre, pommes de terre, &c.

En outre, le nom de "cent" (centième partie du florin des Pays-Bas) et demi-cent sont restés d'un usage populaire ; mais ces anciennes dénominations n'expriment plus la valeur ancienne. " Cent" est employé pour désigner la pièce de deux centimes et " demi-cent" pour la pièce d'un centime.

En détail, on vend encore beaucoup en cents, signifiant deux centimes.

Ce ne fut qu'en Janvier 1844, que la cote des changes de la Bourse d'Anvers cessa de se faire en livres et deniers de gros ou Flamands pour les changes sur Londres, en rixdolers pour Vienne, en sols de change pour Hambourg, en florins des Pays-Bas pour Amsterdam.

Aujourd'hui encore toutes les transactions, n'importe leur importance, se calculent à Anvers à raison de florins courant, pour les grains et les graines, en florins des Pays-Bas pour les cafés, cotons, cuirs, métaux, riz, &c., en florins et sols de change pour les sucres candis.

Mais cet état de choses se modifie presque journellement ; et au fur et à mesure que l'un ou l'autre négociant ou personne influente insiste pour l'extension de l'application du système monétaire actuel à un article de commerce ou à un genre d'affaire quelconque, tout le monde s'empresse de le suivre.

On peut donc dire qu'il suffirait de la volonté bien ferme d'une centaine de personnes pour faire disparaître les dernières traces des anciens systèmes monétaires.

Q. 28. Si le changement était facultatif, l'ancien et le nouveau système continuèrent-ils à être en usage simultanément pendant un certain temps, et continuent-ils encore à être en usage concurremment?——

A. Voir la réponse à la question précédente.

Q. 29. A-t-on trouvé quelques inconvénients à cet usage simultané de plusieurs systèmes? Comment agit-il sur la comptabilité, les billets de Banque, les lettres de change?——

A. Cet état de choses n'a pas donné lieu à des inconvénients ; mais il faut remarquer que toutes les monnaies de compte ayant une tarification officielle toute facture, tout compte, tout billet, &c., quel que soit le système sur lequel il est basé ou calculé, finit toujours par être réduit et

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décompté en une seule et même monnaie, la monnaie de compte officielle, qui est identique avec la monnaie de circulation.

Une seule difficulté s'est présentée, c'est la suivante :

La loi du 5 Juin 1832, avait déterminé que le florin des Pay-Bas serait calculé à raison de 47¼ cents pour un franc, ce qui donnait pour un florin la valeur de fr. 2·11$\frac{64}{100}$.

Le Gouvernement des Pays-Bas ayant réduit, en 1839, la valeur intrinsèque de ses florins, ceux-ci n'obtinrent cours légal par la loi du 4 Mars 1848, qu'au prix de fr. 2·10, valeur exactement et parfaitement égale à leur valeur intrinsèque.

Il surgit alors la question de savoir si les lettres de change tirées, les comptes établis, les ventes faites, depuis cette époque en florins des Pays-Bas, devaient être payés à raison de fr. 2·11 $\frac{64}{100}$, ou à raison de fr. 2·10, et si on pouvait se libérer en nouveaux florins, monnaie des Pays-Bas effective, d'engagements contractés en monnaie des Pays-Bas sans autre désignation.

Mais il a suffi que la question fut soulevée pour que l'opinion publique, d'accord avec les tribunaux, fût unanime pour ne reconnaître en Belgique qu'un seul florin des Pay-Bas, celui de compte, tel qu'il avait été tarifé par la loi du 5 Juin 1832, et que toute somme ne pouvant être payée légalement en Belgique qu'en francs on ne pouvait se libérer en florins des Pays-Bas effectifs d'une obligation contractée en florins des Pays-Bas de compte ; que les deux florins, quoique portant le même nom, étaient deux valeurs différentes, qui devaient être calculées et réduites chacune selon la valeur que la loi lui assignait.

Q. 30. Dans cet état de choses d'une double comptabilité usitée, comment les négociants et les banquiers tiennent-ils leurs comptes ?——

A. Pendant assez longtemps chacun tenait son compte dans la monnaie qu'il préférait, et ce sans grands inconvénients, par suite de la tarification légale des diverses monnaies de comptes. Aujourd'hui, il n'existe probablement plus un seul négociant ou banquier qui tienne ses comptes autrement qu'en francs.

Q. 31. Le changement s'est-il effectué d'une manière efficace, ou bien quelques classes de la société, dans quelques parties du pays, continuent-elles à se servir des anciennes dénominations dans leur conversation, ou bien dans la tenue de leur comptabilité ?——

A. Le changement n'est pas encore radical, ainsi qu'on la fait ressortir en réponse à la 27ème question.

Ainsi, à peu d'exceptions près, on vend encore dans la Belgique entière les grains, graines, &c. en florins courant de Brabant, tant aux marchés publics que dans les bourses commerciales et dans les transactions particulières.

Les denrées et marchandises se côtent en grande partie, à Anvers, en florins des Pays-Bas.

Le peuple, les détaillants, &c. comptent généralement en cents, nom qui dans leur bouche n'a cependant d'autre signification que celle de deux centimes.

Q. 32. Le changement, à l'époque de son introduction, était-il impopulaire dans quelques classe de la société, et dans lesquelles ? Si une pareille impopularité s'est manifesté, a-t-elle été durable ou transitoire ? Existe-elle encore de nos jours ? Le changement causa-t-il quelques commotions populaires, ou répandit-il des inquiétudes et des craintes ?——

A. Aucun des trois changements ne semble avoir été impopulaire.

Le premier ne fut réellement jamais introduit dans les usages de la vie ordinaire, parceque la quantité de la petite et de la grande monnaie en or, en argent, et en cuivre de l'ancien système Belge, était infiniment plus considérable, et d'une circulation bien plus générale dans ce pays, que les monnaies décimales Françaises.

Le second changement se fit très-rapidement, et se généralisa presqu' immédiatement.

Le troisième, grâce à l'usage introduit d'appeler "cent" la pièce de deux centimes, parvient insensiblement à se populariser.

Aucune commotion ne s'est produite ou ne fut provoquée par ces divers changements ; ils ne servirent même jamais de prétexte à des réclamations populaires. Jamais aucun de ces trois changements ne fit même craindre une apparence de troubles.

Q. 33. La nouvelle monnaie est-elle plus ou moins commode que l'ancienne, et quels sont ses avantages et ses désavantages,

1°. En payant ou recevant—(*a*) De grandes sommes ; (*b*) De petites sommes ?

2°. Dans la tenue de la comptabilité—(*a*) Pour les grandes transactions ; (*b*) Pour les petites transactions ?——

A. La nouvelle monnaie, mais surtout la comptabilité nouvelle, est bien plus commode et plus avantageuse que le système antérieur à 1800.

Tant en payant qu'en recevant de petites comme de grandes sommes, on les compte, pour ainsi dire, d'un coup d'œil; et il ne faut pas aujourd'hui, à l'homme le plus minutieux, le quart de temps pour compter une somme de mille francs qu'il lui faillait autrefois pour compter cent florins de Brabant.

Aujourd'hui, lorsque l'on paie une somme en diverses espèces de monnaie nouvelle, l'homme le plus illettré peut vérifier son compte sans aucune difficulté; tandis que sous le système précédent chaque espèce de monnaie exigeait un calcul spécial qui demandait des connaissances arithmétiques assez étendues et qu'il était presque impossible de faire sans avoir la plume à la main.

Quant à la comptabilité, on ne saurait assez faire ressortir la facilité qu'offre à cet égard le système actuel, qui ne présente d'ailleurs aucun inconvénient.

Il serait, pensons-nous, impossible de faire revenir les comptables au vieux système Belge.

Poids et Mesures.

Q. 33. Les poids et mesures sont-ils divisés en fractions décimales? S'il en est ainsi, ce système décimal a-t-il précédé, accompagné, ou suivi la division décimale de la monnaie, ou etait-il sous quelques rapports, et lesquels, en correlation avec cette dernière?——

A. Oui, les poids et mesures sont divisés en fractions décimales.

Le système Français des poids et mesures, tel qu'il résultait des lois de 30 Mars 1791, 1er Août 1793, 18 Germinal an III. (7 Août 1795) et 19 Frimaire an VIII. (10 Décembre 1799), ne fut rendu obligatoire en Belgique qu'à partir du 1er Vendémiaire an X. (21 Septembre 1801). Il accompagna donc, pour ainsi dire, la mise à exécution du nouveau système monetaire. Mais, quoique officiellement introduit, quoique rendu obligatoire dans tous les actes publics sous des amendes considérables, son introduction n'eut pas lieu dans la pratique, durant l'Empire, même pour les mesures agraires.

La loi avait cependant prescrit des pénalités exorbitantes; ainsi aucune pièce, titre public ou privé, ne pouvait faire foi en justice, qu'autant que les quantités fussent exprimés en mesures ou poids nouveaux. (Art. 1er de la loi du 1er Vendémiaire an IV.)

Le Code Pénal (Art. 424, 479, et 480), prive l'acheteur de toute action contre le vendeur qui l'aurait trompé par l'usage des poids et mesures prohibés, et rend passible d'amende, et même d'un emprisonnement de cinq jours, ceux qui emploient des poids ou des mesures différents de ceux que la loi a établis.

Ces dispositions furent ouvertement méconnues.

Le Gouvernement Néerlandais crut faciliter l'usage du système décimal Français en ne donnant, comme il le dit, à l'article 8 de la loi du 21 Août 1816, "que des dénominations usitées aux Pays-Bas, et préférablement les dénominations employées aujourd'hui pour les poids et mesures qui approchent le plus des nouveaux."

Malgré cette précaution, et malgré l'achèvement presque complet du cadastre, établi uniquement en mesures nouvelles, le système des poids et mesures fit plus de progrès en apparence qu'en réalité.

Depuis, et quoique par la loi du 18 Juin 1836, on soit revenu aux dénominations Françaises, les progrès ont été plus signalés; notamment pour les mesures de capacité, qui sont aujourd'hui généralement en usage, à très-peu d'exceptions près.

Pour les poids, l'introduction est bien moins générale, et il y a quelques jours à peine la police a dû agir avec une grande modération à Anvers pour ne pas avoir à constater que presque tous les boutiquiers de cette ville es servent encore de poids proscrits par la loi.

Le progrès est moins général encore pour les mesures agraires; et s'il est vrai qu'on ne désigne que la mesure décimale dans tous les actes de vente, ces ventes se calculent, presqu'exclusivement, en mesures anciennes, tels que les bonniers,verges, pieds carrés.

Pour les mesures de longueur, l'usage de l'ancienne aune de Brabant est encore général dans toutes les transactions de la vie ordinaire; et si la loi oblige le boutiquier à n'exhiber que des mètres, il a soin d'y faire une entaille qui désigne l'aune.

Dans les grandes transactions, le mètre est plus usité que l'aune, qui cependant, aussi bien que le yard Anglais, est employée pour plusieurs catégories d'étoffes, de fils, &c., surtout pour tout ce qui se confectionne en pièces d'une dimension uniforme.

Cet état de choses a été constaté fréquemment, et a motivé la loi du 1er Octobre 1855, qui, plus rigoureuse que les lois antérieures, prescrit l'usage exclusif, même dans les actes sous seing privé, du système décimal des poids et mesures.

L'avenir fera connaître si le résultat désiré sera promptement atteint.

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Il faut donc répondre à la question posée : 1er, Qu'en droit le système décimal des poids et mesures fut introduit simultanément avec le nouveau système monétaire, et qu'il y avait les rapports les plus complets entre eux ; tous deux étant basés identiquement sur le même point de départ, le mètre, comme dix-millionième partie de l'arc du méridien.

2°. Qu'en pratique les poids et mesures anciennes continuèrent longtemps à être presque exclusivement en usage après l'introduction du nouveau système monétaire, et sont encore en très grand usage aujourd'hui.

Q. 35. Si non, a-t-on trouvé qu'il résultait quelques inconvénients du fait que le système de division pour les poids et mesures ne correspondait pas avec celui adopté pour les monnaies ?——

A. Cette différence entre le système monétaire décimal et l'ancien système maintenu dans la pratique pour les poids et mesures, n'a donné lieu à aucun inconvénient. Le prix se fixait toujours par une unité quelconque : il s'établissait alors facilement pour les multiples.

Quant aux subdivisions, lorsque la division ne peut pas s'effectuer exactement, on est convenu tacitement de négliger les fractions inférieures à $\frac{1}{2}$ centime, et à porter à 1 centime les fractions supérieures à $\frac{1}{2}$ centime. Ce mode, usité et nécessité en tous temps, tant sous le système ancien que sous ceux qui l'ont suivi, n'a pas donné lieu à des inconvénients.

Q. 36. Comment peut-on reconcilier la division décimale de la monnaie avec la division non-décimale des denrées dans les ventes de détail des classes pauvres ?
En résulte-t-il des inconvénients et des pertes pour elles ?——

A. Cette difficulté est plus apparente que réele, et elle était aussi grande et au moins aussi fréquente avec le système ancien qu'avec le système nouveau ; ainsi, lorsque Marie-Thérèse décréta, le 19 Septembre, 1749, la fabrication des ducatons, elle fixa leur valeur à 3 florins de change ou $3\frac{1}{2}$ florins courant, et leurs subdivisions à des valeurs proportionnées.

Le 21 Août 1755, elle ordonna que le ducaton serait tarifé fl. 3, 1 sol de change et les subdivisions jusqu'au quart jouiraient de l'augmentation dans la même proportion.

Cette augmentation d'un sol de change, équivalant à 1 sol 2 deniers courant, seule monnaie de compte usitée dans la vie ordinaire, il en résultait que cette augmentation décrétée ne pouvait ni être calculée exactement pour les quarts de ducaton, ni être payée exactement en cas d'échange d'un ducaton entier ; aucune pièce de monnaie existante ne représentant avec précision un sol de change, aucune n'équivalant à deux deniers courant.

Prenons encore pour exemple le système Anglais actuel.

La livre sterling se divise en 20 shellings, et le shelling en 12 pences.

La livre avoirdupois se divise en 16 onces, et une once en 16 drams.

Y a-t-il plus d'analogie entre ces poids et le shelling actuel qu'entre la livre sterling divisé en 10 shellings ou en cent pences ?

Si l'on peut calculer en pences actuels la valeur d'un pouce cube dont 1728 font un yard cube, pourquoi serait-il plus difficile de le calculer en pences décimaux ?. N'en est-il pas de même pour le gill, comme 2048ième partie d'un quarter, un gallon, 42ième partie d'un tièrce, ou un gallon, 63ième partie d'un hogshead ?

Quoiqu'on fasse donc, à moins d'admettre le système décimal comme base unique du système monétaire et de celui des poids et mesures, une parfaite concordance est impossible, et des fractions inévitables.

Quant à l'avantage ou au désavantage qui en résulte pour la classe pauvre, il faut certes reconnaître que généralement le détaillant ne forcerait pas les fractions à son propre détriment, mais à celui de sa pratique, si la concurrence ne venait pas l'arrêter.

Généralement la concurrence rétablit la fraction en faveur de l'acheteur. Ainsi, comme on l'a dit plus haut, lorsqu'en 1832 on rétablit les francs, presque tous les articles qui se vendaient en détail à des prix presqu'invariables—par exemple, le verre de bierre, le petit verre de liqueur, la tasse de café, &c.—se donnèrent pour deux centimes par cens, ou à un prix présentant à peu-près 5 par cent au profit du consommateur.

Chez l'épicier, il est rare que la concurrence lui permette de majorer ses prix dans les plus petites subdivisions, chaque fois qu'une augmentation de prix ne représente pas à très peu de choses près, pour chacune d'elles, la valeur d'un centime ; souvent d'ailleurs, pour les articles d'une grande consommation en détail, pour le sel, le café, le savon, etc., les plus petites subdivisions se calculent et s'établissent jusques en demi-centimes, qu'on compense lors des paiements simultanés ou subséquents.

Ces inconvénients sont d'ailleurs inhérents à toute vente de détail ; et quelque uniformité de système qu'on établisse, on ne parviendra jamais à percevoir exactement la somme due pour la consommation journalière d'un ménage pauvre chaque fois qu'une denrée augmente dans une proportion ordinaire.

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Comment (quelque soit le système adopté) faire majorer le prix d'une once de café, lorsque la livre n'est augmentée que d'un ou de deux centimes ; celle d'un demi-litre d'huile, lorsque l'hectolitre a augmenté de 50 ou 60 centimes ; ou celle d'un panier de charbon, lorsque le tonneau a été majoré de quelques francs, &c. ?

Aucun système quelconque ne parviendra jamais à faire disparaître la nécessité de forcer ou d'effacer des fractions, un jour au détriment du vendeur, le lendemain à celui du consommateur.

Q. 37. Vouloir ajouter tout autre renseignement qu'on jugera utile pour cette enquête, et joindre à ces réponses des copies de toutes les lois, ordonnances, rapports, ou documents relatifs aux changements de monnaie, ou exposant les raisons de ce changement, et le mode suivi pour le mettre a exécution ?——

A. Toutes les lois et tous les arrêtés royaux depuis 1830, sont mentionnés dans l'imprimé ci-joint.

Voir pour les Pays-Bas, le livre remarquable intitulé, " Le Système Monétaire du Royaume des Pays-Bas, la Refonte des Vieilles Monnaies d'Argent et la Démonétisation de l'Or : par A. Vrolik, Docteur des Sciences, Président de la Commission des Monnaies (actuellement Ministre des Finances,) à Utrecht, chez T. G. Broese, 1853. 1 vol. in 8vo.

Joindre à ces réponses un exemplaire de tous les documents et de toutes les lois, arrêtés, instructions, &c. qui ont accompagné ou suivi les divers changements de nos systèmes monétaires, serait expédier une masse indigeste et probablement peu utile.

Si l'attention de Messieurs les Commissaires de l'enquête se fixait plus particulièrement sur l'un ou l'autre point de ces renseignements, on s'empresserait, à la première demande, de le compléter autant que possible, en y joignant tous les documents que l'on pourrait se procurer, et dont les plus intéressants sont en réalité étrangers à la Belgique actuelle et ne se trouvent que fort difficilement.

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No. 33. Belgium.

Through T. Baring, Esq.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* KINGDOM of BELGIUM.

Communicated by THOS. BARING, Esq., M.P.

Present Money of Account.

Q. 1. What is the money of account at present established by law ?——

A. Francs and centimes.

Q. 2. What are the subdivisions of such money of account ?——

A. One franc is subdivided into a hundred centimes.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations ?——

A. None but francs and centimes can be legally recorded.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom ?——

A. One franc is equal to $9\frac{386}{1000}$ pence sterling.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal ?——

A. Silver coins of 5 francs equal to 3 shillings, $10\frac{9300}{10000}$ pence sterling.

,,	$2\frac{1}{2}$	,,	,,	1	,,	$11\frac{4650}{10000}$	,,
,,	2	,,	,,	1	,,	$6\frac{7720}{10000}$	,,
,,	1	,,	,,	0	,,	$9\frac{3860}{10000}$	,,
,,	50	centimes	,,	0	,,	$4\frac{6930}{10000}$	,,
,,	20	,,	,,	0	,,	$1\frac{8772}{10000}$	,,
Copper coins of	10	,,	,,	0	,,	$0\frac{9386}{10000}$	,,
,,	5	,,	,,	0	,,	$0\frac{4693}{10000}$	,,
,,	2	,,	,,	0	,,	$0\frac{1877}{10000}$	,,
,,	1	,,	,,	0	,,	$0\frac{0939}{10000}$	,,

Neither gold nor mixed metal coins form at present part of the legal currency of Belgium. All French decimal silver coins are a legal tender in Belgium, the standard being identical in both countries. A good deal of French gold is occasionally met with, but it circulates merely on sufferance, like any other foreign gold or silver coins, and cannot be legally tendered in payment. Coins of fifty centimes are not admitted in pay-

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ment for more than one tenth of the sum to be paid; and as to copper coins the law does not allow the introduction of more than five francs' worth to each separate payment, twenty centime silver pieces being in that respect assimilated to copper.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. The answer must be negative as far as regards one centime pieces.

Q. 7. What is the coin of lowest value in common use?——

A. Copper coins of five and two centimes are most in common use. Ten centimes as well as one centime pieces are only occasionally met with, especially the last named.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. The divisions of the small silver and copper coins being chiefly the result of the dictates of local experience, they seem to answer well enough in practice, and it does not appear that any complaints are thereby occasioned or inconveniences felt. Ten centime copper pieces are found rather heavy for the pocket, and are consequently by no means so abundant as five and two centime pieces. The two centime pieces are comparatively scarce, as they are continually finding their way into Holland, where the people make them pass current for cents of a Netherland guilder. It is indeed a well-founded complaint of the lower classes in Belgium that there is not enough of copper money circulating in the country.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

Q. 10. What was its legal value relatively to the present money of account?——

Q. 11. What coins were current, and of what value, in the former money of account?——

Change of Money.

Q. 12. When did the change take place?——

Q. 13. What was the cause of the change?——

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?——

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either a as a money of account or of exchange before it was established by law?——

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a nondecimal division?——

Q. 20. In what way was the change effected?——

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

Q. 24. Were any old names given to new coins, or new names to old coins?——

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. At the end of the last century, when the French took possession of the Austrian Netherlands, now forming the kingdom of Belgium, a most deplorable confusion of coins, and monies of account innumerable prevailed in those provinces, almost every one of which had its own private currency, concurrently with that of the German empire, so that the compulsory introduction of the French decimal system was actually a boon conferred on the populations.

In order to furnish here a correct specification of the monies and coins existing in the Austrian Netherlands and principality of Liege at the moment of their incorporation to France, it would actually require one's entering into archæological researches and laborious investigations, the result of which would now offer little practical interest. The change having been introduced by the mere right of conquest, the conquerors did not give themselves much trouble about explaining or justifying their measures, so that no other records are to be found in Belgium beyond the mere acts of the then ruling French powers, decreeing the annexation and assimila-

tion of the various Belgian provinces, and their division into French departments; such of the coins as were strictly Austrian or German finding their way back to those countries as they best might, whilst local ordinances fixed a value at which the various Belgian provincial coins could still be passed concurrently with French monies.

The answers to the questions from No. 9 down to No. 25 must, therefore, be sought from the parties who have been consulted on the same subject in France, where they have had at their disposal the necessary documents and records, as replies from Belgium to the same questions can only be the result of personal appreciation, based on mere theories.

After the formation of the kingdom of the United Netherlands, Government finding it necessary to introduce a general system of currency for the whole country, adopted the Brabant Exchange Guilder, a mere money of account, never coined in Belgium, but which was still in use by many, especially in Antwerp and Brussels for private book keeping, and happened to be precisely of the same value as the Dutch Currency Guilder. This was henceforth issued and coined under the appellation of Netherlands Guilders, and subdivided into decimal fractions, each the hundredth part of one guilder, and called cents, in lieu of the old divisions in stivers and farthings, of which there were 20 stivers to the guilder, and 12 farthings to the stiver. By the time that the revolution of 1830 came on, the Netherlands guilder and its subdivisions had become the chief money of account, and indeed the only official one throughout Belgium, whilst French coins, both gold and silver, to the exclusion of mixed metal and copper, continued to circulate as legal tender concurrently with the Netherlands coins at the acknowledged par of 400 francs to 189 guilders. The old Brabant coins had several years previously been recalled into the Government offices and the mint of the Netherlands, where they had been melted and re-coined.

This state of things, notwithstanding the erection of the Belgian provinces into a separate kingdom, lasted till the 5th June 1832, when a monetary law was promulgated by the Belgian Government, re-establishing the French monetary system with the franc as the unit, and admitting at the same time the Netherland coins issued during the union with Belgium to circulate until further orders as a legal tender, concurrently with the French and new Belgian coins, at the par of 189 guilders for 400 francs. The Netherlands silver and copper coins did not long remain in circulation, but the Netherlands gold coins of ten and five guilders continued to be one of the chief circulating mediums in Belgium, until they were called in by the Netherlands Government and suppressed. The Belgian Government took shortly afterwards the opportunity of recalling a few millions of francs' worth of gold coins it had issued, and prohibited the circulation of French gold coins as a legal tender, which dispositions have greatly tended to increase the circulation of the notes of the new bank, established at Brussels under the appellation of the National Bank, being, notwithstanding its title, a mere private establishment, having now notes in circulation to an extent of upwards of 96,000,000 of francs, being in fact the only establishment of the kind in Belgium now allowed to issue bank notes. These notes, though accepted in the Government offices, are no legal tender, but would, no doubt, in case of serious complications have to be made such immediately, in mere self-defence, as became the case in 1848 with the notes of other establishments, the issues of which have been superseded and replaced by the National Bank, since created.

As above stated, the change took place at the time of the conquest of the Austrian Netherlands by the French; and, leaving aside the question of assimilation of the newly annexed territories, which of course carried its own weight with it, it may be fairly stated that the introduction of the decimal metric system was in itself an immense benefit rendered to the community at large, by the substitution of a system reposing on an invariable basis, lucid and rational in its application, and above all highly convenient in the practice, to a multitude of complicated and obsolete systems, the result of routine and habit prevailing in the various provinces, and creating an almost incredible confusion. The higher classes of the mercantile community immediately adopted the change of which they could comprehend the many advantages, but not so with the small tradespeople and shopkeepers, especially those having to deal with farmers and countrymen, who made good pickings out of the existing confusion, so that Brabant guilders and stivers are still denominations daily made use of, although they have no monetary representatives, concurrently with francs and centimes, as well as Netherlands guilders and cents. Officially, of course, none but francs and centimes are ever mentioned, and that is the reason why at Antwerp, where goods are still bought and sold in Nether-

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lands decimal money, all public sales take place in francs and centimes, The majority of the merchants now keep their books and make their entries in francs, in order to conform themselves to the rules of the bank which keeps its accounts solely in francs. In the country large sums are generally mentioned in francs; small sums connected with the country people's daily dealings in Brabant guilders and stivers; and such is the force of habit with the Flemish peasants that, at this very day, in the districts round Dunkirk, where the Flemish language still prevails, the farmers, though under French rule since King Lewis the Fourteenth, still speak of guilders and stivers, meaning by the same francs and sous of five centimes. In usual life every man in Belgium is compelled to have constantly at hand his tables of reduction of the various monies both past and present.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. By simply stipulating an equitable relative value between the old coins and the newly introduced ones, so that the change had no effect on the interests of the parties concerned.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. The change was immediate and made compulsory for all public deeds and writings, that means, such as were received by notaries or other public officers; the penalty consisting in a fine, light in itself, but applicable for every contravention. The same also for private acts and writings presented to be registered. Originally, indeed, the law pronounced the nullity of acts not couched in legal money; but that penalty does not appear to have been ever applied, being found too severe. Until quite lately, one was allowed to mention, accessorily, the old monies in an act or deed, provided the legal ones appeared foremost in the same. This is, however, now strictly forbidden, and public officers are fined 100 francs for the first trespass of the kind, and 200 francs for the second, and a deed under private hand and seal presented at a stamp office to be registered would be rejected if drawn in money no longer legal in Belgium. Whatever systems may still be made use of in popular language, there is only one legal system now in use in Belgium, viz., francs and centimes, and accounts cannot otherwise be legally kept.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. Legally at least, if not effectually so; farmers and small shopkeepers still continuing to use the old denominations of Brabant guilders and stivers, especially in the Flemish provinces.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. See answers to queries 9 up to 25.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. There is not enough difference in the value of Brabant or Netherlands guilders and francs to render either of them more convenient than the other, so far as the value thereof is concerned, but in book-keeping and all sorts of calculations the advantages of a decimal system scarcely need to be pointed out, the same being so very obvious.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

General Query.

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Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect?——

A. The French decimal system of weights and measures was introduced in Belgium at the time of the conquest, towards the end of the last century simultaneously with that of the decimal monetary system, and still continues in force in all the applications it is susceptible of, under the same names and applications as in France. During the union with the Dutch Netherlands the names had been changed, but the system was nevertheless strictly kept up. Since the erection of Belgium into an independent kingdom the French names have again been resumed.

Notwithstanding the legal introduction full sixty years ago of the decimal metric system of weights and measures, the old local systems have not ceased to exist, though their existence was wholly illegal. In Antwerp and other important places the new systems have long been at work, especially for large transactions, but with the country people, as well as the lower orders in the towns, the old weights and measures are still the order of the day and any other hardly spoken of. One must not, however, suppose that such weights and measures are tolerated by laws; quite the reverse; the mere possession of old weights and measures constituting in itself a misdemeanor, for which the law provides and actually inflicts fines and punishments. The people employ decimal weights or measures, and have recourse to summary reductions and quaint calculations, to transform the result into the old weights and measures which vary almost from province to province, and to which they are so attached that it will be very difficult ever to eradicate the same completely. Small dealers do their best to keep up this state of things, as the confusion now subsisting prevents ignorant customers from calculating off hand the prices at which the goods stand to such dealers.

Habit and routine are wonderful things; it would otherwise hardly be credited that up to this day on the Antwerp Exchange grain still sells in Brabant guilders, though by decimal weights and measures, and that the Antwerp sugar refiners sell their sugars by 100 pounds old Antwerp weight, through a laborious reduction from the actual weight taken in kilogrammes from the scales.

Till recently old weights and measures were allowed to be mentioned in deeds and printed documents, provided the legal ones appeared foremost in the same; but this is now no longer tolerated, and Government seems disposed to enforce the laws. Respecting the latter, as well as for the monies, reference of course must be made to such elucidations as will have been obtained on the subject from France, whence the system, as above stated, was introduced into Belgium as a consequence of the conquest, and the French penal laws respecting the same promulgated in Belgium, where they have never ceased remaining in force down to this very day.

Antwerp, 5th May 1856.

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Her Majesty's Minister.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* KINGDOM OF BELGIUM.

Sent by HER MAJESTY'S MINISTER at BRUSSELS.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. The franc. The system, weight and standard, are the same as in France. Belgium has no gold coin.

Q. 2. What are the subdivions of such money of account?——

A. The centime or hundreth part of a franc.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denomitions?——

No; the franc is both money of account and the coin.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The franc contains 69·4 grains pure silver, which makes its value 0·808*s.*, or 9·69*d.* The centime or hundredth part of the franc would, at the above rate, be worth 0·0969*d.* Its weight in copper is 2 grammes or 30·8640 troy grains.

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Her Majesty's Minister.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. Silver coins of 20 centimes, 50 centimes, 1 franc, 2 francs, 2½ francs, and 5 francs. Copper coins of 10 centimes, 5 centimes, 2 centimes, and 1 centime.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Yes.

Q. 7. What is the coin of lowest value in common use?——

A. The centime in copper, and the piece of 20 centimes in silver.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. No.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The florin subdivided into 100 cents.

Q. 10. What was its legal value relatively to the present money of account?——

A. The florin is a legal tender of the value of two francs and ten centimes.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. By the Royal Arrête of 8 Dec. 1824, forty-three coins were recognised as legal tenders at a fixed valuation in florins. (For the list vide page 3 of the "Legislation Monétaire," herewith enclosed.

Change of Money.

Q. 12. When did the change take place?——

A. By the law of 5 June 1832. (Vide page 2).

Q. 13. What was the cause of the change?——

F. The diversity and bad state of the coinage, and the importance of establishing one uniform and decimal currency.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. The great number of coins led to inconvenience, to confusion, and to complexity.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. These inconveniences existed, but owing to long habit were not much complained of.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?——

A. Official printed tariffs were used to facilitate payments and account keeping.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. Losses of fractional sums fell always on the working and middle class in making small payments.

Q. 18. Was the change caused to any and what extent by a desire to assimilitate the currency to that of neighbouring countries? and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. The Belgian Legislature acted for the avowed object of adopting the French currency, in order to facilitate the frequent relations between the two countries.

The new currency being identical with that of France, had already become very familiar through the union of Belgium with France down to 1814.

After the latter period, the French silver currency remained a legal tender in the southern provinces of the Kingdom of the Netherlands. (*i. e.* in Belgium).

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a nondecimal division?——

A. The Decimal System was already sanctioned by use.

Thus theoretical and practical advantages were combined.

Q. 20. In what way was the change effected?——

A. The Belgian currency was established by the law of 5 June 1832.

The ancient coins, which were not very numerous, were gradually withdrawn from circulation. (Vide page 5, &c.)

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Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. No.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. The coins mentioned above (vide No. 5.), excepting the pieces of 20 centimes and of $2\frac{1}{2}$ francs, which were only decreed later.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. All the ancient coins have been gradually withdrawn, except the 1 florin and $2\frac{1}{2}$ florin pieces, which are still admitted as legal tenders.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. The franc is the name of the new monetary unit. The old coins retained their names.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. No. The old currency was only expressible in francs, centimes, and fractions of centimes.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c., belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. By the law of 1832 it was enacted that all engagements dated before the 1st of January 1833, and contracted in florins, shall be discharged at the rate of $47\frac{1}{2}$ hundredths of the florin to one franc.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. The change was immediate and compulsory for all public and administrative acts; not compulsory for private transactions.

The ancient system is very rarely used. Still the terms *cent* and half-*cent* remain in the popular language, though no longer expressing their ancient value. A *cent* is used to designate the 2 centime piece.

Retail dealers sell frequently in *cents*, meaning 2 centimes.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. There are no more ancient coins. For some time the two systems remained in use concurrently.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. The concurrent use was only tolerated.

The value of the ancient coin in relation to the legal currency was regulated by official tariffs, and thus all transactions in accounts, bank notes, and bills of exchange were calculated in the official currency.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. The ancient coin was received only as representing its *value*. Accounts are now universally kept in the new currency.

Q. 31. Has the change been effectully made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. The change has not yet been radical and complete. The ancient usages long survived in the masses. Here and there ancient denominations, proscribed for sixty years, are used, but this is a raretion.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. The country was already accustomed to the new system.

There was no commotion.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.

2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions?——

A. The new currency is much more convenient than the former currencies, as it substitutes a uniform system for a multiplicity of coins different in name and value.

This is an advantage felt in every species of payment and account.

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Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. The decimal metrical system was already established by the law of 21 August 1816.

A law of 1 October 1855, renders it more rigorously and exclusively enforced. Even in private contracts, commercial books, and other private acts produced in justice, the legal denominations must be exclusively employed.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. The decimal metrical system was adopted in 1816, and therefore legally preceded the decimal division of money which did not come into operation till 1832.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. The fractions resulting from reductions are always detrimental to the poorer classes.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.——

A. The accompanying pamphlet "Législation Monétaire de la Belgique de 1830 à 1855," extracted from the "Revue de la Numismatique Belge," tom v., gives an epitome of all the laws and royal arrêtés on the subject.

For the Netherlands, vide the remarkable book entitled, "Le Système "Monétaire du Royaume des Pays Bas, la Refonte des vieilles "Monnaies d'Argent, et la Démonétisation de l'Or, par A. Vrolik, "Docteur ès Sciences, Président de la Commission des Monnaies, "(actuellement Ministre des Finances). Utrecht, chez J. G. Broese, "1853. 1 vol. in 8vo."

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SWITZERLAND.

My Lord, Bern, May 2, 1856.

Upon the receipt of your Lordship's despatch, marked circular of the 7th of March, instructing me to procure and transmit to your Lordship all the information I might be able to obtain from any persons acquainted with the question of Decimal Coinage and its introduction into this country, from private as well as from official sources, I addressed myself to the Federal Council, to a banking house in this city, to a scientific gentleman in Zurich through the latter, and to Her Majesty's Consul at Geneva, in order to obtain from these several quarters replies to the paper of questions from the Decimal Coinage Commission which formed the enclosure of your Lordship's above-cited despatch.

I have now received from the three first of these sources the papers which I sent to them for this purpose, with answers noted to the several questions contained in them, and I have the honour to enclose the same herewith.

Paper A. contains a copy of the answers furnished by the Federal Council; they were transmitted to me with the enclosed note, and, in addition to the information which they supply, your Lordship will find annexed thereto a number of documents bearing upon the arguments for and against, the mode of carrying into effect and the nature of the change which was operated in the Swiss monetary system in 1850, by which the various, numerous and complicated denominations of coinage previously existing in the country were swept away, and the present uniform decimal French system adopted, and rendered compulsory on the whole Confederation.

Paper B., answered by a member of the firm of Messrs. Marcuard and Co. of this city, refers to the change of the monetary system as regards especially the large canton of Bern.

Paper C., answered by M. Trümpler of Zurich, applies to the change generally all over the Confederation.

I have received no reply as yet from Geneva, and perhaps may fail in obtaining one from thence. I have thought it best, therefore, not to delay longer in forwarding to your Lordship, for the use of the Decimal Coinage Commission, the information which I am now enabled to communicate.

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I feel but little competent to offer any observations myself upon the subject of this despatch, and I hope that the full answers so obligingly made to the papers of questions I have the honour to forward herewith, together with the documents of various sorts which accompany Paper A., and which we owe to the courtesy of the Federal Council, will render anything I could offer quite superfluous. I beg leave, therefore, only to invite attention to the fact, that, whilst it will be observed that the change of the monetary system in Switzerland and the adoption of a Decimal Coinage appears to have been effected without difficulty and to meet now with universal approbation, it must, at the same time, be recollected that the circumstances under which it was carried out were peculiar, both from the magnitude of the evils which the immense variety of the previously existing monetary systems and coinage in the country occasioned, and which were thus at one blow annihilated, as well as from the advantages and facilities presented by the change that was accomplished, from its assimilating the Swiss monetary system with that of its powerful neighbour, France, on the one hand, and with that of the Sardinian states on the other, with both of which countries the relations of Switzerland are constant and important.

I have, &c.
(Signed) G. J. R. Gordon.

The Earl of Clarendon,
&c. &c. &c.

P.S. May 3.—I have this morning received from Mr. Consul Pictet the paper of questions and answers marked D., which have been furnished by an old Commissariat Officer of Captain Pictet's acquaintance, and which I have the satisfaction to enclose with the other papers.

(Signed) G. J. R. G.

A.

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Federal Council.

Answers to Queries proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards* SWITZERLAND.

Prepared by the direction of the Federal Council of the Swiss Confederation.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. Le franc, égal au franc de France.

Q. 2. What are the subdivisions of such money of account?——

A. Le centime ou rappe, centième partie du franc.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. On ne compte qu'en francs et centimes.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. Le franc vaut 0·8 shilling (la livre sterling supposée égale à 25 francs), le centime vaut 0·096 penny (1 shilling = 12 pence).

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. Les monnaies légales et en circulation générale sont:—

Pièce de 5 francs, pesant	25 grammes	} Contenant $\frac{9}{10}$ d'argent. et $\frac{1}{10}$ de cuivre.	
„ 2	„ 10	„	
„ 1	„ 5	„	
„ $\frac{1}{2}$	„ $2\frac{1}{2}$	„	
„ 20 centimes	3·25	„ contenant $\frac{150}{1000}$ d'argent.	
„ 10	„ 2·5	„ „ $\frac{100}{1000}$ „	
„ 5	„ 1·667	„ „ $\frac{50}{1000}$ „	
„ 2	„ 2·5	} Composées de cuivre, étain, et zinc (même alliage que les nouveaux sous Français).	
„ 1	„ 1·5		

L'alliage des pièces de 20, 10, et 5 centimes est composé d'argent, de nickel de cuivre, et de zinc. Pour comparer la valeur des monnaies Suisses avec celle des monnaies de compte Anglaises on adoptera encore 1 livre sterling à 20 shillings = 25 francs. Pour comparer la valeur des monnaies Suisses avec celle des monnaies courantes Anglaises la seule base praticable parait

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être le poids de l'argent fin contenu dans le franc et dans le (nouveau) shilling ; or 1 franc contient 4·500, 1 shilling 5·231 grammes d'argent.

	Monnaie Anglaise.	
	De compte.	Courante.
	s. *d.*	*s.* *d.*
La piece de 5 francs vaut - -	4 0	4 3·62
„ 2 „ - - -	1 7·20	1 8·65
„ 1 „ - - -	0 9·60	0 10·32
„ 0½ „ - - -	0 4·80	0 5·16
„ 20 centimes - - -	0 1·92	0 2·06
„ 10 „ - - -	0 0·96	0 1·03
„ 5 „ - - -	0 0·48	0 0·52
„ 2 „ - - -	0 0·192	0 0·206
„ 1 „ - - -	0 0·096	0 0·103

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Oui, les pièces de 1 centime.

Q 7. What is the coin of lowest value in common use?——

A. La pièce de 1 centime.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. Non.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. Avant la constitution actuelle de la Confédération Suisse, les 22 cantons qui la composaient étaient souverains dans les affaires monétaires, et il existait un grand nombre de monnaies de compte dont les principales étaient :—

(Ancien) Franc divisé en 10 batz à 10 rappes.
Florin „ 60 kreuzer à 4 deniers.
Différens florins divisés en 40 schillings à 4 rappes.
Couronne à 25 batz, &c. &c.

Q. 10. What was its legal value relatively to the present money of account?——

A. L'ancien franc valait à peu près 1f. 43c.
Les florins valaient de 2f. 32c. à 1f. 71c.
La couronne valait 3f. 57c., &c.

11. *Q.* What coins were current, and of what value, in the former money of account?——

A. Pièces d'or :
2, 1 et ½ Louis d'or ou doublon, le doublon à 22f. 86c.
8, 6, 5, 4, 3, 2, 1½ & ¼ de ducats ; le ducat à 11f. 43c., &c.
Pièces d'argent :
4, 2, 1, & ½ francs, le franc à 1f. 43c.
2, 1, ½, ¼, & ⅛ de florins ; le florin de 2f. 32c. à 1f. 71c., &c. &c.
Cependant les pièces d'or et les grandes pièces d'argent Suisse circulaient assez peu, et elles étaient loin de pouvoir suffire aux besoins en numéraire ; la plus grande partie des grosses pièces circulantes étaient des 5 francs Français, des couronnes de Brabant, des florins d'Allemagne, et des pièces de 20 kreuzer d'Autriche.

Change of Money.

12. *Q.* When did the change take place?——

A. La Constitution Fédérale de l'année 1848 dépouilla les cantons de leur autorité en affaires monétaires, mit celles-ci dans les mains de l'autorité fédérale, et demanda une réforme monétaire. La nouvelle loi fédérale sur les monnaies date de 1850, et l'exécution de la réforme monétaire eut lieu en 1851 et 1852.

13. What was the cause of the change?——

14. *Q.* Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. Ce qui vient d'être émis plus haut (réponses aux questions 9 et 11) explique déjà bien l'urgente nécessité qui existait et qu'on sentait depuis

50 ans, de réformer à fond les affaires monétaires. La principale raison fut cependant celle, que les pièces Françaises et Allemandes se faisaient peu à peu et de plus en plus cours à un taux abusif et trop élevé en comparaison des monnaies Suisses; ainsi la pièce de 5 francs Française, tarifiée au commencement de ce siècle à 34 batz, fut donnée et acceptée finalement à $35\frac{1}{2}$ batz; le florin monta de $14\frac{3}{8}$ à 15 batz, &c. A mesure que le cours abusif de l'une ou l'autre monnaie étrangère haussa, elle chassait et rechassait l'autre. Ces cours abusifs n'ayant cependant pas été adoptés légalement, la même pièce avait deux valeurs différentes, l'une plus élevée dans les paiemens du grand et du petit commerce, l'autre dans les paiemens d'intérêt, du loyer, &c.

15. *Q.* Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. Non.

16. *Q.* Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?——

A. Voir la réponse à la question No. 14.

17. *Q.* If such inconveniences existed, by what classes of society were they chiefly felt?——

A. C'était surtout la classe peu aisée qui souffrait de l'état des choses; elle était obligée d'accepter l'argent au taux abusif, et très souvent elle ne pouvait en faire emploi qu'au taux légal.

18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries: and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

18. La Suisse étant un pays trop petit et en trop de relations avec d'autres pays pour fonder un nouveau système monétaire sur un principe tout particulier, et n'ayant en outre pas l'intention de pourvoir elle-même à tous les besoins de numéraire, il ne s'agissait guère pour elle que de choisir entre les systèmes de ses voisins, c'est à dire, entre le franc adopté en France et en Sardaigne, et le florin, monnaie de l'union monétaire des états de l'Allemagne méridionale. Le système Français l'emporta à cause des relations plus fréquentes avec les pays qui l'ont adopté qu'avec les états qui se servent du florin, et encore à cause de la grande stabilité qu'on se promettait à cette époque du système Français avec sa base métrique. Il faut ajouter qu'en adoptant le franc Français en argent, on exclut cependant par principe dans la nouvelle loi fédérale les pièces d'or pour n'avoir que l'argent comme étalon unique. Il est clair que la partie occidentale de la Suisse se prononçait entièrement et vivement pour le système Français. Tandis que l'est aurait en général préféré l'union monétaire avec les états voisins Allemands.

A l'exception du canton de Genève, qui déjà depuis 10 ans avait entièrement adopté le système Français comme monnaie de compte et comme monnaie courante, on ne compta guère en Suisse en francs de France, mais, comme il a été déjà dit, les pièces de 5 francs, sous la dénomination de "35 batz," formaient une partie considérable du numéraire circulant en Suisse, et les pièces divisionnaires, 2, 1, et $\frac{1}{2}$ francs (ainsi que l'or Français) étaient de même connues dans tout le pays avant l'introduction du nouveau système.

19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. La division décimale fut une des raisons secondaires qui firent adopter le franc plutôt que le florin. Les avantages d'une pareille division étaient connus dans une bonne partie de la Suisse, où l'on avait pour monnaie de compte l'ancien franc divisé en 10 batz à 10 rappes.

20. *Q.* In what way was the change effected?——

A. Toutes les monnaies, or, argent, billon, et cuivre, frappeés antérieurement dans le territoire actuel de la Conféderation Suisse, par la République Helvétique, les cantons, les évêques et les seigneurs, furent retirées de la circulation, détruites par la font, et remplacées par les nouvelles espèces. Le retrait eut lieu par canton ou par groupe de plusieurs cantons, en commençant à l'ouest de la Suisse et en terminant à l'est; il dura un mois dans chaque canton ou dans chaque groupe, de manière qu'un an après le commencement du retrait cette opération se trouvait terminée dans tout le pays.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. Nous avons dit plus haut que les florins d'Allemagne avaient acquis peu à peu un cours abusif de 15 batz, trop élevé en comparaison de la pièce de 5 francs, qui valait généralement 35 batz, et moyennant ce cours abusif, ces florins Allemands envahissaient de plus en plus la Suisse en chassant l'argent Suisse et les pièces de 5 francs. Pour attirer plutôt ces dernières, et rechasser les florins, on tarifa pour les caisses fédérales la pi ce de 5 francs à $35\frac{1}{2}$ batz

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déjà quelque temps avant l'exécution de la réforme monétaire, et ce nouveau tarif se fit valoir aussi dans les transactions particulières. Les monnaies d'origine Suisse, dont les grosses pièces n'étaient guère dans la circulation générale, n'éprouvèrent aucun changement jusqu'au retrait.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change ?——

A. Nous avons vu que les pièces de 5 francs Françaises, qui servent aujourd'hui de monnaie principale légale, se trouvaient déjà dans le pays en grande quantité avant la réforme. Abstraction faite de ces pièces, la mise en circulation des nouvelles pièces à l'effigie Suisse se fit, en retirant les anciennes monnaies Suisses comme paiement pour ces dernières. Depuis la réforme on ne mit en circulation que des pièces de cuivre qui avaient été frappées et émises lors de la réforme en trop petite quantité pour suffire aux besoins.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new ?——

A. Le principal but de la réforme étant de faire disparaître la grande variété des espèces d'anciennes monnaies, et ces anciennes monnaies n'entrant guère dans le nouveau système (excepté le billon de Genève), toutes les anciennes espèces d'origine Suisses furent retirées. Le billon Allemand, qui avait circulé en grand nombre dans la partie de la Suisse limitrophe à l'Allemagne, n'entrant pas non plus dans le nouveau système, et n'ayant plus de valeur légale, alla regagner sa patrie sans que l'autorité s'en mêla. Les pièces d'argent Allemandes, qui avaient fait une partie du numéraire avant la réforme, et qui n'étaient pas si faciles à éloigner, surtout à l'époque de la réforme, où les cours pour l'Allemagne étaient bas, restèrent encore quelque temps, et les cantons furent autorisés à leur donner un cours légal passager un peu au dessous de leur valeur intrinsèque, relativement à la monnaie Suisse.

Q. 24. Were any old names given to new coins, or new names to old coins ?——

A. Le nom de franc, qui fut donné à la nouvelle unité, devait être choisi, parceque cette unité est absolument la même que le franc de France, et que l'on voulait donner cours légal en France aux nouvelles pièces d'argent Suisses comme les pièces Françaises (et Belges et celles de Sardaigne) ont cours légal en Suisse. Nous avons vu qu'avant la réforme une autre espèce de monnaie de la valeur de $\frac{1}{7}^{0}$ du franc actuel avait porté le même nom. De même le nom de "rappe," autrefois la centième partie de l'ancien franc, fut donné au centième du nouveau franc. Pour la Suisse Française on donna à cette dernière pièce le nom de " centime," en usage en France. Le nom de " batz," qui signifiait autrefois $\frac{1}{10}$ de l'ancien franc, a été donné, non par la loi, mais par le peuple dans quelques parties de la Suisse à la nouvelle pièce de 10 centimes.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies ?——

A. La pièce de 5 francs ayant valu autrefois généralement 35 batz, on peut dire que 7 anciens " batz" étaient égaux à un franc nouveau. Il s'en suit que les anciennes menues monnaies ne pouvaient être exactement exprimées en nouvelle valeur.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new ? Or, in the case of fixed money tolls, pontages, duties, &c., belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements ?——

A. Pour fixer en nouvelle valeur les dettes ou d'autres engagemens contractés sous l'ancien régime monétaire, chaque canton établit, sous l'approbation des autorités fédérales, une loi de réduction précise, basée sur la valeur intrinsèque des anciennes monnaies relativement aux nouvelles.

Q. 27. Was the change in the money of account gradual or immediate ? Was it optional or compulsory ? If compulsory, how and by what penalties was it enforced ? Was it effectually enforced ? or did the old system continue in use for any and what time in accounts or in popular language ?——

A. Les anciennes monnaies, représentants de l'ancienne monnaie de compte, n'existant plus, et les anciennes valeurs n'étant exprimables en nouvelles monnaies, il fallut nécessairement changer la monnaie de compte en même temps que les nouvelles monnaies remplacèrent les anciennes, et des peines de contravention étaient donc entièrement superflues. L'ancien système ne resta en usage que dans la langue du peuple, d'où il disparait de plus en plus.

Quant aux monnaies étrangères au pays, et au système actuel, qui avait servi de monnaie de compte et comme monnaies courantes dans quelques parties du pays, (par exemple, les florins d'Allemagne,) la nouvelle loi monétaire

établit que des conventions peuvent être stipulées comme auparavant en monnaies étrangères, mais que les paies (gages, salaire) ne doivent se faire qu'en monnaies légales.

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Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently ?——

A. Voir la réponse à la question précédente.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use ? How does such concurrent use affect accounts, bank notes, and bills of exchange ?——

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts ?——

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts ?——

A. On peut dire que la réforme fut éxécuté de la maniére la plus satisfaisante, et qu'elle eut un plein succès. Il est clair que les personnes moins instruites ont eu plus de peine à s'y accommoder, et on peut dire que dans les contrées industrielles la réforme a pris pied plus vîte et plus facilement que dans les contrées agricoles. C'est surtout dans ces dernières qu'on parle encore assez souvent des anciens "batz" dans les petites transactions.

Le nouveau système se trouve toutefois exposé à un danger de plus en plus imminent, et auquel il lui sera probablement impossible de résister à la longue.

La Suisse ne frappant pas elle-même les grosses pièces (il ne fut frappé qu'un petit nombre de 5 francs comme représentans), elle les tire de la France par l'entremise du commerce. Mais en France l'argent va de plus en plus être remplacé par l'or, et le commerce Suisse ne pouvant plus obtenir des pièces d'argent, fait venir de l'or ; de sorte que l'or Français, sans être légalement admis, circule en Suisse de plus en plus, et l'argent va disparaître comme en France. Or l'or Français n'est dans aucun rapport avec le système métrique, et la base stable reposant sur le franc en argent va donc être perdue.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society ? If any such unpopularity existed, has it been transitory or lasting ? Does it now exist ? Did the change cause any popular commotions or uneasiness ?——

A. Tout le peuple était convaincu de la nécessité urgente d'une réforme quelconque. Il y eut bien au commencement une aversion contre le système Français adopté dans la partie du peuple limitrophe de l'Allemagne, mais elle ne fut que passagère, et maintenant tout le peuple se trouve fort satisfait de l'état actuel. L'exécution de la réforme ne causa aucune animosité, elle se fit même, grace à l'instruction généralement répandue et avancée du peuple Suisse, bien plus facilement qu'on n'avait osé l'espérer.

Q 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages ?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.

2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. La nouvelle monnaie étant la même pour tout le pays, et ayant remplacé une foule d'anciennes espèces différentes d'un canton à l'autre, elle facilite beaucoup toutes les transactions d'une partie du pays à l'autre. Elle rendait aussi plus faciles les transactions avec la France, aussi longtemps que les monnaies d'argent prévalaient dans ce dernier pays. La nouvelle monnaie ayant une suite de représentans assez peu éloignés l'un de l'autre par leur valeur (5, 2, 1, $\frac{1}{2}$, $\frac{2}{10}$, $\frac{1}{10}$, $\frac{5}{100}$, $\frac{2}{100}$, $\frac{1}{100}$,) cela facilite les petites transactions. La comptabilité offre encore par la division décimale de la monnaie, un avantage que ne possédait qu'une partie des anciennes monnaies.

Weights and Measures.

Q. 34. Are weights and measures divided decimally ? If so, did such decimal division precede, accompany, or follow the decimal division of money ? Or was it in any and what way connected with it ?——

A. Les poids et mesures sont basés sur un système mixte, décimal et duodécimal, de la manière suivante :—

Mesures de longueur :

Le pied à 10 pouces à 10 lignes ; la brache à 2 pieds, l'aune à 4 pieds, la toise à 6 pieds, la perche à 10 pieds, la lieue à 16,000 pieds.

Mesures carrées :

Pied, toise, perche, arpent, lieue, carrées.

Mesures cubiques :

I. Pied, toise, perche, cubiques.

II. Mesures creuses, pour objets non liquides : Sester (=15 litres, soit 30 livres d'eau) ; $\frac{1}{10}$ de sester ; malter (10 sesters), ou $\frac{1}{10}$ de sester.

III. Mesures pour liquides : Pot ($1\frac{1}{2}$ litres soit 3 livres d'eau) ; char à 400 ; muids à 100 pots; seau à 25 pots; $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ de pot.

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Poids :

Livre ($=\frac{1}{5\,4}$ de pied cube d'eau dans sa plus grande densité $=\frac{1}{2}$ kilo) divisé en 32 demi onces, ou en 16 onces, ou en $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ de livre, ou 500 grammes. (La dernière division est très peu en usage dans la vie commune.)

Quintal à 100 livres.

Ce système fut adopté par 12 cantons, qui ont conclu un concordat le 17 Août 1835 et un arrêté de la Diète Fédéral du 26 Juillet 1836 a étendu ce système à toutes les transactions fédérales comme règle obligatoire. Il est rendu obligatoire dès le 1 Janvier 1857, pour toute la Suisse, par la loi fédérale du 23 Décembre 1851.

En choisissant ce système de poids on tâcha de concilier les anciennes habitudes avec un nouveau système, qui serait en rapport exact, et expressible avec le système métrique. Voici ces rapports :—

1 pied $= \frac{3}{1\,0}$ de mètre.
1 sester $= 1\frac{1}{2}$ décalitres.
1 pot $= 1\frac{1}{2}$ litres.
1 livre $= \frac{1}{2}$ kilogramme.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money ?——

A. On ne pourrait dire que les rapports entre le système des poids et mesures et celui des monnaies donnassent lieu à des inconvéniens graves. Cependant, quelques cantons de ceux qui n'ont pas encore introduit le nouveau système des poids et mesures ont fait leur possible pour introduire en Suisse le système métrique pur et simple, et il est probable que, si on avait à recommencer, ce dernier système, étant celui qui, plus que tout autre, a la chance de devenir le système universel, serait préféré au système mixt actuel.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes ? Does inconvenience or loss arise to them therefrom ?——

A. Comme il existe des monnaies d'une valeur minime, on ne pourrait dire que des inconvéniens ou des pertes quelconques résultent de la désharmonie dans la division des poids et mesures et des monnaies, là où cette désharmonie a lieu.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. Nous ajoutons à ces réponses :—

No. 1. Rapport et projet de loi sur la monnaie, par l'Expert Fédéral des Monnaies M. Speiser, à Bâle, d. d. 6 Octobre 1849.

No. 2. Rapport et projet de loi du Conseil Fédéral sur la matière, d. d. ? Novembre 1849.

No. 3. Rapport sur la question de la réforme monétaire, présenté par la majorité de la commission du Conseil des Etats, d. d. ? (fin 1849.)

No. 4. Rapport présenté par la minorité de la dite commission du Conseil des Etats sur la même question, présenté le 12 Décembre 1849.

Nos. 5 et 6. Rapports présentés par les deux parties de la commission du Conseil National sur la même question, d. d. ? Mars et 5 Avril 1850.

No. 7. Mémoire sur la question des monnaies, présenté par M. Borel, Consul Suisse à Bruxelles, d. d. 10 Février 1850, avec supplément, d. d.

Nos. 8 et 9. Loi sur les monnaies et sur l'exécution de la réforme monétaire, d. d. 7 Mai 1850.

No. 10. Rapport sur la mise en exécution de la réforme monétaire, faisant partie du rapport annuel du Département Fédéral des finances, pour l'année 1851.

No. 11. Rapport final sur la réforme monétaire, présenté par la Commission Fédérale des monnaies, au mois de Mars 1853, et faisant partie du rapport annuel du département des finances, pour l'année 1852.

No. 12. Loi sur les poids et mesures du 23 Décembre 1851.

No. 13. Rapport et proposition de la commission du Conseil National, du 23 Juillet 1851.

No. 14. Rapport de la minorité de la commission du 30 Juillet 1851.

B.

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Marcuard & Co.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* CANTON of BERNE, SWITZERLAND.

By a MEMBER of the Firm of Messrs. MARCUARD and Co., of Berne.

Present Money of Account.

Q. 1. What is the money of account at present established by law ?——

A. Francs de France.

Q. 2. What are the subdivisions of such money of account ?——

A. Centimes.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations ?——

A. Non.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom ?——

A. L'écu de cinq francs de France et le centime, dont la valeur sera connue en argent Anglais.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal ?——

A. L'écu de 5 francs ; les pièces de 2, 1, et $\frac{1}{2}$ francs, en argent ; les pièces de 20. 10, et 5 centimes d'un mélange de cuivre, argent, et nickel ; les pièces de 2 et 1 centimes en cuivre.

Q. 6. Are coins representing the lowest denomination of money of account in common use ?——

A. Oui.

Q. 7. What is the coin of lowest value in common use ?——

A. Le centime.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society ?——

A. Non.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system ? What were its subdivisions ?——

A. Le franc ou la livre de Suisse de 10 batz, ou de 100 rappes pièces.

Q. 10. What was its legal value relatively to the present money of account ?——

A. La livre de Suisse valait (à raison de 69 rappes pour 1 franc de France) 1 f. $44\frac{9}{10}$ c.

Q. 11. What coins were current, and of what value, in the former money of account ?——

	l.
A. En monnaies d'or, le Louis d'or - - -	16·0
Le double et le demi dans la proportion.	
Le Napoléon d'or à raison de - - - -	13·80
L'ancien écu de 6 francs de France pour - -	4·0
L'écu de Brabant ou de Bavière pour - -	3·95
L'écu de 5 franc de France pour - - -	3·45

et ses fractions dans la proportion.)

Les pièces de 20, 10, 5, $2\frac{1}{2}$, 1, $\frac{1}{2}$, et $\frac{1}{4}$ de batz.)

Change of Money.

Q. 12. When did the change take place ?——

A. En 1852 avec le 1 Janvier on a commencé à Berne à compter et à payer en nouvelles monnaies.

Q. 13. What was the cause of the change ?——

A. Il y avait plusieurs raisons. Chaque canton ayant ses taxations à lui, il en résultait une confusion ; plusieurs cantons avaient aussi une masse de mauvais billon. La nouvelle Confédération voulait adopter un pied monétaire unique pour toute la Suisse, en abolissant toutes ces diverses monnaies et leurs diverses taxations.

Q. 14. Was it caused by any inconvenience, confusion, or complexity in the state of the previous currency ?——

A. La confusion dans les diverses taxations et prohibitions était à son comble; non seulement les cantons avaient des tarifs différents, mais encore, par exemple, dans le canton de Berne il y avait un tarif légal des espèces et un

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tarif courant ou abusif. Le tarif légal s'entendait pour tout payement à l'Etat, caisses publiques, capitaux, &c., et le tarif courant pour payement de marchandises, bétail, chevaux, et produits de l'agriculture. Dans ce dernier cas on donnait en payement l'écu de Bavière pour 40 batz, l'écu de 5 francs pour 35 batz, et les fractions dans la proportion. On marchandait non seulement sur le prix de la marchandise, mais encore sur le taux des monnaies à recevoir en payement.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other ?——

A. Les proportions d'une monnaie à l'autre étaient beaucoup plus faciles à calculer au tarif courant ou abusif qu'au taux légal.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping ?

A. Les inconvénients résultant des divers tarifs de monnaies en livres de Suisse étaient principalement sentis en payant et en recevant de l'argent mais ils l'étaient également dans la tenue des livres, qui se tenaient en valeur légale, ce qui nécessitait surtout dans le livre de caisse à chaque instant des réductions du tarif courant ou abusif au tarif légal.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt ?——

A. Ces inconvénients étaient principalement sentis par le commerce et par le paysan, qui recevait le prix de ses denrées au tarif abusif, et était obligé de payer ses dettes et leurs intérêts au capitaliste au tarif légal.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries ; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law ?——

A. Une des raisons de changer notre système monétaire était certainement aussi de l'assimiler à celui de France, pays voisin auquel les cantons de l'ouest étaient obligés d'avoir recours pour en faire venir de l'argent quand il leur manquait. L'argent de France était familier à la population, parceque depuis que les écus de 6 livres de France étaient mis hors de cours à cause de leur usure, ils avaient été remplacés par les écus de 5 francs et ses fractions qui circulaient à 34½ et 35 batz, ou 3·50l. de Suisse.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division ?——

A. Comme notre ancienne livre de Suisse se divisait en 10 batz, et le batz en 10 rappes, nous avions déjà le système décimal, mais ceci n'était pas le cas pour les cantons de l'est limitrophes de l'Allemagne, et qui comptaient en florins et kreuzer.

L'Assemblée Fédérale ayant décidé l'adoption du système monétaire Français pour toute la Suisse, on fixa à chaque canton un terme jusqu'auquel il devait retirer de la circulation les monnaies mises hors de cours.

Q. 20. In what way was the change effected?——

A. Pendant ce temps on fit frapper à l'étranger, Strasbourg, Paris, Bruxelles, des écus de 5 francs et ses fractions, comme aussi du billon à l'effigie fédérale, mais au titre et poid des monnaies Françaises pour remplacer les anciennes monnaies.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. Comme toutes les monnaies autres que Françaises furent mises hors de cours ou retirées, il n'y avaient pas lieu à changer leur valeur.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. Aussitôt que l'adoption du pied monétaire Français fut adoptée ou décidée, on commanda la frappe des pièces nouvelles mentionnées à l'Article 20, afin qu'il y en eut une certaine quantité au moment de l'entrée en vigueur du nouveau pied monétaire.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new ?——

A. Toutes les pièces de monnaie Suisse furent retirées à l'exception des écus de 5 francs de France et ses fractions.

Q. 24. Were any old names given to new coins, or new names to old coins ?——

A. On intitula les pièces de 10 centimes, batz ; les 5 centimes, ½ batz ; et centimes, rappes ; mais cela n'a guère pris, on les nomme par leur valeur Française, comme les écus de 5 francs, 2 francs, et 1 franc, qu'avant le changement on nommait vulgairement pièces de 35, 14, et 7 batz.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies ?——

A. A l'Article 10 nous avons indiqué la valeur en nouvelle monnaie de l'ancienne livre de Suisse, ou de la pièce de 10 batz ; les pièces de 5, 2½, 1, et ½ batz ont leur valeur dans la proportion ; cependant au tarif courant ou abusif les pièces de 5 batz valaient 70c., les 2½ 35 c., et les batz 15c.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. Toute dette à l'état, caisse public, loyer de maison, dettes sur hypothèque ou par obligation, furent réduites au tarif légal de chaque canton pour le franc de France en nouvelle valeur fédérale soit dans le canton de Berne à raison de 69l. anciens pour 100 francs nouveaux, et pour dettes en argent courant ou au tarif abusif à raison de 70l. pour 100 francs.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. Comme il a déjà été dit plus haut on fixa à chaque canton un terme, passé lequel on devait non seulement faire les payements en nouvelle monnaie, mais aussi stipuler tous les titres en nouvel argent; on défendit aux notaires de stipuler des actes autrement, et chaque stipulation de francs de Suisse sans autre explication est considérée par les tribunaux être nouvelle valeur.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. Seulement pour les marchés de bétail et de foins; les paysans et vachers ont continué jusqu'à présent à les faire généralement en Louis d'or et en ancienne valeur au taux abusif de manière que la réduction en nouveaux francs devient facile. Cependant on commence aussi à faire de marches de bétails en pièces de 20 francs, et en nouveaux francs.

Cette exception n'affecte du reste nullement la nouvelle manière de compté; on connait les réductions d'avance; elle n'est d'aucune influence non plus sur la tenue des livres des banquiers et des négocians.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. Personne ne tient plus ses comptes en ancienne valeur, et on ne parle que de nouveaux francs et centimes.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or easiness?——

A. Le changement du système monétaire n'était point impopulaire, parceque tout le monde comprenait facilement qu'il mettrait fin à la confusion qui existait; seulement on critiquait la forme des nouvelles monnaies, principalement du billon.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. Les nouvelles monnaies sont plus commodes que les anciennes, parceque d'abord les monnaies Françaises sont mieux frappées que celles qu'on avait auparavant; on peut facilement en faire des pilles; les écus de 5 francs sont tous de la même grandeur, tandis qu'il n'en était pas de même des écus de 6 francs de France et de Bavière; seulement les pièces de 10 et de 5 centimes sont trop petites, et ne se distinguent pas assez des pièces de 50 centimes.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. La Confédération a aussi adopté en même temps ou peu avant, de nouveaux poids et mesures fédéraux, mais à notre connaissance il n'y a que le nouveau pied fédéral qui ait obtenu une division décimale en 10 pouces et 10 lignes, et que les mesures de poids et de liquide ne soient pas au système décimal n'est d'aucun inconvénient pour les divisions des nouvelles monnaies.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. Il n'en est résulté aucun inconvénient pour les classes pauvres puisque dans le nouveau système il trouve des monnaies plus petites que dans

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l'ancien, peutêtre, seulement trop petites, parcequ'avec un centime seul on ne peut rien acheter, il faut qu'il en ait 2 ou 3 pour qu'il puisse acheter un morceau de pain. Dans l'ancien système il y avait aussi des centimes ou rappes, mais les monnaies étaient très rares; la plus petite monnaie en circulation ordinaire était la pièce de $2\frac{1}{2}$ rappes ou le kreuzer valant le quart d'un batz, ou en nouveau valeur $3\frac{1}{2}$ centimes. Celui qui vivait d'aumônes vivait mieux alors qu'aujourd'hui, où il faut qu'il se contente souvent d'une pièce de 2 centimes. En attendant dans la paye des ouvriers, et surtout des journaliers à la campagne, on a conservé les mêmes prix pour les journées en ancienne monnaie, qu'on réduit alors au centime près en nouvelle monnaie, et le journalier n'abandonne pas un seul centime, lorsqu'il sait qu'il complette les 8 ou 9 batz qu'il recevait sous l'ancien système pour prix de sa journée.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

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C.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards* SWITZERLAND.

By M. TRÜMPLER, of Zurich.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. New Swiss francs, being the same as French francs.

Q. 2. What are the subdivisions of such money of account?——

A. Centimes or cents.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. No, we know of nothing but francs and centimes.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The value of French money, as compared with sterling money, is sufficiently known in England.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. All French, Belgian, and Sardinian, as well as Swiss *silver* coins, they all being coined according to the French law. Twenty, ten, and five cent pieces of mixed metal (nickel, &c.) coined in Switzerland, and Swiss copper coins of one and two cents.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Yes, the one and two cent coins are.

Q. 7. What is the coin of lowest value in common use?——

A. One cent; but few except very poor people will use anything below a five cent piece, the same as in France coins below a sous are not much in use, only we do not say sous, we say a five.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. No.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. Up to 1850 there were about twenty different monies of account in Switzerland, with a multitude of subdivisions.

Q. 10. What was its legal value relatively to the present money of account?——

A. Owing to the great many kinds of money of account under which Switzerland laboured before 1850, it would be impossible to answer this question without writing a long treatise.

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M. Trümpler.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. All kinds of German dollars, German florins, Austrian zwanzigers, French five-franc pieces, subdivisions of the above, and about a hundred different Swiss coins. The legal value of most coins was different in almost every canton, and the current value differed everywhere from the legal value.

Change of Money.

Q. 12. When did the change take place?——

A. In 1850 and 1851.

Q. 13. What was the cause of the change?——

A. The confusion then existing, the desire to have one kind of money only, the wish that it should be the money of one of the larger neighbouring states, either France or Germany (the German florin, called 24 gulden fuss); the French system was preferred owing to its decimal subdivisions.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. Yes. See Nos. 9 to 12.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. Yes. See Nos. 9 to 12.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?——

A. Yes, in paying or receiving, as well as in account keeping.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. By all classes, but chiefly by the lower.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. The first part of this question is answered under No. 13. The French five-franc piece, and the French one-franc piece, especially the former, had been in general circulation for a great number of years; its value, either as a money of account or of exchange, as expressed in, or compared with, old Swiss francs, florins, crowns, batzen, &c., &c., was familiar to every person.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. We had to make our choice between the French system and the florin of Southern Germany, called the 24 gulden fuss, which is subdivided into 60 kreutzers. The florin would have been preferred by the majority of the cantons, but the decimal division turned the scale in favour of the French system, and everyone, including myself, who was opposed to it, is now glad of it.

Q. 20. In what way was the change effected?——

A. Gradually in the course of 1850 and 1851, by withdrawing all the old Swiss coins, exchanging them against new Swiss (including French, &c.) coins; and by abolishing all legal value of foreign coins other than French, &c.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. The old Swiss coins were withdrawn, the French five-franc pieces already in circulation became the money of the country, and all other foreign coins, which were in use before either as legal or as current money, became merchandise.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. See No. 20.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. See Nos. 20 and 21. The old coins were only permitted to circulate simultaneously with the new during a month or two in each canton, during which they were entirely got rid of, as everyone was glad to send them into the public exchange offices for new Swiss (or French) coin.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. Yes, in most parts of Switzerland the public accounts had been kept in old Swiss francs and tenths, called batzen, and cents called raps, and in some cantons the current money was also old Swiss francs, these Swiss francs again differing between each other from one to three or four per cent. Our present law calls the subdivision or hundredth part of the new Swiss or French franc a rap, to which stupid fancy the public have done justice by adopting the expression of "centime."

No. 35c. Switzerland.

M. Trümpler.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. Not precisely commensurate; but French coins having been before in general circulation, everyone, even the lowest beggar, was familiar with their value as compared with the florins, Louis d'ors, crowns, old francs, batzen, raps, shillings, kreutzers, &c., in which prices were expressed in his locality.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. The law fixed the day in each canton at and from which all former engagements, debts, tolls, duties, &c. &c., were payable in new money, *id est*, in French francs. At the same time it fixed the scale at which every kind of money in use before that day was to be reduced by calculation into new francs; however different from each other the old monies of account may have been, the French five-franc piece had already under the old law its legal value for each such kind of money of account, so that, adopting this coin as a basis, it was easy to fix the scale of conversion.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. The change was immediate on a given day in each canton; it was compulsory. The law forbids contracts in old monies of account by imposing penalties, but there is no occasion for them, everyone being glad of the present order as compared with the former confusion. The old system does not continue in use for any accounts whatever; in some parts they still sell cattle, for instance, or land, for so many crowns, but before payment is made, or a contract reduced into writing, the value is calculated in legal francs, exactly as you say ten guineas and pay 10*l.* 10*s.*

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. See No. 27.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. See No. 27.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. See No. 27.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. See No. 27.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. Popular altogether, as explained before.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. More convenient in every respect.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. Weights are not divided decimally. Measures are.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measure, not corresponding with the divisions of money?——

A. No inconvenience whatever. Suppose a pound weight costs a franc, half a quarter or 1-8th of a pound will cost 12½ cents, and the buyer will pay either 12 or 13 cents, the half cent which cannot be paid being of course considered as nothing. Besides, as everywhere, people do not ask to buy infinitesimal parts of pounds or yards, but ask for 5 or 10 cents' worth of a commodity.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. See No. 35.

No. 35c. Switzerland.

M. Trümpler.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the snbject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. Switzerland, the same as Belgium, has so far adopted the French silver standard only. French gold is merchandise, and people may take it or not as they please; but the Napoleons, or twenty-franc pieces, are in such general circulation (for twenty francs of course) that, unless a change takes place in France, which is not likely, Switzerland will have to legalize French gold, *id est*, to adopt the French system, the double standard, altogether. The coin we want, and of which a constant importation must take place to fill up the void created byre-exportation to Germany for corn, we can only get in France. We have become part and parcel of France so far as monetary transactions go. Silver coins getting scarcer in France, we have no choice but to take her gold coins. Some of our banks have already been compelled to declare that "in their transactions they give and take "legal Swiss money, *id est*, Swiss, French, &c. silver, and French gold "indiscriminately."

Zurich, April 10, 1856. F. H. Trümpler.

D.

No. 35d. Switzerland.

Commissariat Officer.

Answers to Queries proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* CANTON of GENEVA, SWITZERLAND.

By an old Commissariat Officer, at the request of Captain A. Pictet, H.B.M. Consul at Geneva.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

Q. 2. What are the subdivisions of such money of account?——

A. Les francs fédéraux, au même titre que le franc Français, divisé en cent centimes.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Il n'y a pas d'autre dénomination en usage.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. L'unité la plus élevée est le franc, qui équivaut à 9 pence $\frac{4}{10}$, et l'unité la plus basse est un centime qui équivaut à $\frac{9\,4}{1\,0\,0}$ du penny.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. Les espèces en cours sont les piecès de 2 francs, 1 francs, 50 cents., en argent.
" " les pièces de 20 cents, 10 cents, 05 cents, en argent et nikel.
" " les pièces de 2 cents, 1 cent, en cuivre.
Les pièces d'or de France, Belgique, et Savoie ont cours pour leur valeur nominale; quelquefois elles valent une prime comme aussi elles pourraient valoir moins, suivant la valeur relative de l'or et de l'argent, l'or n'ayant pas un cours fixe et forcé en Suisse.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Les pièces de monnaie de la plus petite dimension sont d'un usage populaire dans les marchés de denrées.

Q. 7. What is the coin of lowest value in common use?——

A. La pièce de 5 cents est bien la monnaie la plus petite dont on se sert le plus.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. On ne fait pas grand usage dans les transactions des marchés ou du commerce des petites pièces en cuivre au dessous de 5 cents.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. Le précédent système monétaire était assez compliqué, se composant de plusieurs monnaies qui n'avaient pas de rapport direct entre elles.

No. 35D. Switzerland.

Commissariat Officer.

Q. 10. What was its legal value relatively to the present money of account?——

A. Elles n'avaient pas de rapport légal avec le nouveau système.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. Le précédent système monétaire admettait une grande variété de monnaies étrangères tarifées à certain taux par le Gouvernement.

Change of Money.

Q. 12. When did the change take place?——

A. Le Gouvernement de Genève adopta le système décimal Français en 1840 et le Gouvernement Fédéral Suisse l'a décrété pour toute la Suisse in 1850.

Q. 13. What was the cause of the change?——

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. L'effet de ces changements a été de faire disparaître l'irregularité des transactions que présentait l'ancien système.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. L'ancien système duodécimal ne convenait plus dans nos transactions avec nos voisins de France et de Savoie, où le système décimal métrique est en vigueur.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?——

A. Le changement a eu lieu parceque les monnaies qui nous arrivaient de nos voisins, et qui étaient devenues la circulation en usage, ne correspondaient pas à nos monnaies.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. Ces inconvénients étaient éprouvés par toutes les classes de la société.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. On était déjà assez accoutumé au système décimal par l'usage des monnaies Françaises.

Q. 19. Or was the change caused to any what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. Le besoin d'un changement était donc généralement senti.

Q. 20. In what way was the change effected?——

A. Ce changement a eu lieu par une loi du Conseil Législatif, qui décréta le rachat à leur valeur courante des monnaies nationales, et le rachat ou l'échange jusqu'à une époque fixée, contre la nouvelle monnaie décimale au cours nominal des anciennes valeurs.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. Les anciennes valeurs furent donc mises hors de cours après l'expiration du délai fixé pour l'échange.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?

A. Les nouvelles monnaies avaient été frappées par le Gouvernement d'avance pour en effectuer simultanément l'échange.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. Voyez la réponse No. 21.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. Les dénominations des anciennes monnaies ont disparu.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. La plus petite monnaie ancienne en circulation était le demi sol de Genève, valant environ 2 centimes actuels.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. D'après les mesures prises par le Gouvernement, comme il a été déjà dit à l'Article 20, les difficultés qu'on pouvait redouter entre débiteur et créancier se sont aplanies sans trop d'achoppement.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. La réponse se trouve dans l'article précédent.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. Il n'y a plus eu qu'un seul système monétaire dans toute la Suisse depuis 1850.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. Après 1850 les deux systèmes monétaires se sont graduellement fondus l'un dans l'autre, et maintenant il ne reste plus de trace du premier.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. Tous les comptes se tiennent actuellement en monnaies décimales.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. La réponse est dans les articles précédens. Il n'y a plus de trace du système duodécimal.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. Le changement ne pouvait qu'être désiré par les populations, qui y voyaient un avantage résultant de la simplification dans la manière de compter.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. La nouvelle monnaie a des avantages evidens sur l'ancienne dans les petites comme dans les grandes transactions.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. Le système décimal Français pour les poids et mesures bien que décrété par le Conseil Fédéral pour toute la Suisse, n'est pas encore universellement en vigueur dans le canton de Genève, mais il ne tardera pas de l'être. Les inconvénients qu'on pouvait redouter de ce mélange de l'ancien système avec le nouveau vont disparaître.

Q. 38. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. Les œufs qui se comptent à la douzaine se vendent sans peine à 50 centimes. Il en est de même pour autres choses.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect?——

A. On croit avoir répondu catégoriquement dans les articles précédens, mais quant aux loix et ordonnances relatives Le Conseil Fédéral Suisse pourrait seul les fournir au Gouvernement de Sa Majesté Britannique.

No. 36.

Letters of W. Brown, Esq., M.P., on the Change of Coin in Prussia and Switzerland.

My dear Sir, Richmond Hill, January 4, 1856,

I understood from you that you visit Switzerland occasionally, and that there was no difficulty after the law passed for decimalizing the Swiss currency to its general introduction. Notwithstanding that in some of the cantons, if not in all, people were full of obstinate prejudices, yet they at once adopted a system without dissatisfaction, which they found so convenient. I need not trouble you with stating to me anything that occurred prior to the passing of the Act of 1848, as I am aware that there were long discussions whether they would take a German or French coin for their basis.

My object in troubling you to write me a note on the subject is, that I may lay facts before the Decimal Commission, now sitting.

I have, &c.

E. Zwilchenbart, Esq. (Signed) Wm. Brown.

No. 36.
Switzerland.

Letters, &c.

Introduction of the Swiss Decimal Coinage.

Dear Sir, Roselands, Aigburth, January 8, 1856.

With reference to your inquiry on the subject mentioned above, I have the honour to state that at the period of the change in the currency some half a dozen of the cantons raised a strong opposition, but they afterwards, as you are aware, submitted to the majority. The opposition, it should be mentioned, was on the part of the governments of the said cantons, and arose from an apprehension that a loss would result from the intended change;—ultimately, however, this feeling expired, and the new coinage is now regarded as a happy event for the whole of Switzerland.

I have, &c.
(Signed) Em. Zwilchenbart.

William Brown, Esq., M.P., &c., &c.,
Richmond Hill.

My dear Sir, Richmond Hill, January 4, 1856.

From the conversation I had with you last night, I found that you knew not only something about the introduction of the Swiss decimal currency, but also of the Prussian.

With respect to the Swiss I am aware that the cantons were a long time debating whether they would take a German or a French coin as the basis of theirs. The cantons on the German side wanted to take the German; those on the French side, the French. The Diet ultimately adopted the latter, and passed a law in 1848 for carrying it into effect.

What I wish particularly to know is, whether there were any riots, discontent, or passive resistance to the new coin and decimal system on its introduction.

I do not know what preliminary steps were taken in Prussia, but that is not so very material. Will you be good enough to inform me when the decimal law passed, and whether it was as quietly adopted in Prussia as in Switzerland.

My object in asking you to write me a few lines on this subject is that I may transmit the facts of those cases to the Commissioners now sitting and discussing the subject.

I believe your partner, Mr. Zwilchenbart, and Mr. Speiser, of Basle, were prime movers in conferring this benefit on Switzerland.

I have, &c.
Augustus H. Lemonius, Esq. (Signed) Wm. Brown.

My dear Sir, Liverpool, January 7, 1856.

In reply to your inquiry, permit me to state, to the best of my knowledge, whilst living in Prussia, that the introduction of a new coin by the government of that country about the year 1833 (substituting 30 groschens for a thaler in lieu of 24 groschens) caused no riots or even serious discontent, nor any passive resistance, and that the only difficulty experienced was that always attendant amongst the lower classes upon the withdrawal of an old accustomed coin, but which difficulty ceased altogether within a few months.

I cannot speak from experience as to the circumstances accompanying the introduction of the decimal system into Switzerland, but I have always understood that not the slightest disorder took place.

I have, &c.
(Signed) Aug. H. Lemonius.

William Brown, Esq., M.P.

My dear Sir, Richmond Hill, January 7, 1856.

I will feel obliged if you can inform me if there was any difficulty, after the law passed for decimalizing the Swiss currency, to its general introduction.

I am aware that the cantons were a long time debating whether they would take a German or a French coin as the basis of theirs; the cantons on the German side wanted to take the German, those on the French side the French. The Diet ultimately adopted the latter, and passed a law in 1848 for carrying it into effect.

What I wish particularly to know is, whether there were any riots, discontent, or passive resistance to the new coin and decimal system on its introduction.

My object in troubling you to write me a note on the subject is, that I may lay facts before the Commissioners now sitting.

I have, &c.
R. Zwilchenbart, Esq. (Signed) Wm. Brown.

I find my former letter intended for you was by mistake sent to your brother.

My dear Sir, Liverpool, January 7, 1856.

In reply to your inquiry of this day, I need only say, that to the best of my knowledge, the introduction of the decimal coinage into Switzerland was unattended with any dangerous opposition or riots; in the smaller cantons alone some discontent of no great importance was manifested. The system works, to all appearances, most satisfactorily.

I have, &c.
Wm. Brown, Esq., M.P. (Signed) E. R. Zwilchenbart.

No. 37.
Switzerland.

Federal Law.

No. 37.

On the CHANGE of COINAGE in SWITZERLAND.

MY LORD, Richmond Hill, Liverpool, 26th December 1855.

I AM now enabled to place in your Lordship's hands a translated copy of the Law of the Swiss Diet, but I have not had time as yet to get information how the law was received and carried out. * * * * *

I have, &c.
(Signed) WM. BROWN.

Right Hon. Lord Monteagle,
&c. &c. &c.

LAW of the SWISS DIET on the FEDERAL COINAGE of May, 1850.

THE Diet of the Swiss Confederation, in accordance with the 36th Article of the Constitution, determines—

Article 1. That 5 grammes of silver, 9-10th fine, shall constitute the monetary unit of Switzerland, and shall be called a franc.

Article 2. The franc shall be divided into 100 rapps (centimes).

Article 3. The denominations of the coinage shall be:

A.—In Silver.	B.—In Billon.
The 5 franc piece.	The 20 rapp piece.
The 2 ditto.	The 10 ditto.
The 1 ditto.	The 5 ditto.
The $\frac{1}{2}$ ditto.	

C.—In Copper.

The 2 rapp piece. The rapp.

Article 4. The silver sorts shall be of the same fineness as the monetary unit, and of the same proportion in weight as is expressed by their names.

The 20 rapp piece shall weigh $3\frac{1}{4}$ grammes, and shall contain $\frac{150}{1000}$ fine silver.
The 10 rapp piece shall weigh $2\frac{1}{2}$ grammes, and shall contain $\frac{100}{1000}$ fine silver.
The 5 rapp piece shall weigh $1\frac{2}{3}$ grammes, and shall contain $\frac{50}{1000}$ fine silver.
The alloy of the billon shall consist of copper, zinc, and nickel.
The copper sorts shall consist of copper and tin.
The 2 rapp piece shall weigh $2\frac{1}{2}$ grammes.
The rap $1\frac{1}{2}$ grammes.

Article 5. The margin for error (remedy) in the Swiss coinage shall be determined for all the silver denominations, as $\frac{2}{1000}$. No excess or deficiency (betterness or worseness).

For the denominations in billon, as $\frac{7}{1000}$. No excess or deficiency.

Any deviations that may arise in deficiency must be compensated by corresponding ones in excess.

Article 6. The margin of error in weight, either in excess or deficiency, is determined as:—

A.—In the Silver Pieces.			B.—In the Billon Pieces.		
The 5 franc piece		$\frac{3}{1000}$.	The 20 rapp pieces		$\frac{12}{1000}$.
The 2	ditto	$\frac{5}{1000}$.	The 10	ditto	$\frac{15}{1000}$.
The 1	ditto	$\frac{5}{1000}$.	The 5	ditto	$\frac{18}{1000}$.
The $\frac{1}{2}$	ditto	$\frac{7}{1000}$.			

C.—In the Copper Pieces.

The 1 and 2 rapp pieces $\frac{15}{1000}$.

This limit of error applies in the silver and billon denominations to each piece, but in the copper only to an average of 10 francs by tale, or 1,000 grammes by weight. Any deviations by deficiency must be compensated by corresponding ones in excess.

Article 7. No one shall be obliged to take any other coins except such silver ones as shall be found to correspond with those struck under the present law, and which shall be proclaimed by the Federal Council (after investigation made) as a means of payment corresponding with its conditions with reference to money contracts which have been entered into previous to the enactment of this law. The cantons shall determine in the course of the year 1850 the footing upon which they shall be converted, and shall publish, in connexion with the Federal Council, proper tables of conversion, on the one hand, for the coins mentioned in such contracts, and, on the other, for such as shall have been specially stipulated, but which are called in by virtue of this law, into their corresponding value in the new coinage. Any contracts which shall be entered into after the enactment of this law in the terms of any foreign law or currency, shall be taken in their literal sense. Any wages contract, however, must be in the legal coinage, and the wages themselves must be paid in the legal coins.

Article 9. The public functionaries of the Confederation are forbidden to receive in payment of dues any but the legal coins; but in extraordinary times, when, in consequence of a high rate of exchange there shall arise a scarcity of legal coin, they shall be allowed to receive other descriptions of coins. To this end, so soon and for as long as the course of exchange corresponding with the French standard shall be half per cent. and more above the silver par, the Federal Council shall publish a tariff of such coins, other than the legal currency (in correspondence with this fineness and weight), in accordance with which they shall be received at all public offices.

No. 37. Switzerland. — Federal Law.

Article 10. No one shall be obliged to receive more than 20 francs in value of the silver coins under the one franc piece, more than 20 francs worth of billon, or more than two francs of copper in payment, whatever may be the amount to be paid.

Article 11. The Federal Council shall determine in each canton those public offices which shall be obliged from time to time to exchange Swiss billon and copper coins, but not in less amount than 50 francs at a time.

Article 12. The Diet shall determine from time to time the amount and denomination of any coinage to take place.

Article 13. The worn Swiss coinage shall be called in and melted, and replaced by new; the consequent expense shall be stated in the budget.

The Federal Council determines—

That the foregoing federal law on the reform of the Swiss coinage shall be communicated to every canton for customary publication, and, at the same time, to be printed in the Federal Gazette and the official collection of the Confederation.

Berne, 10th May, 1850. In the name of the Swiss Federal Council.
Federal President, H. Druey.
Chancellor of the Confederation, Schiess.

Federal Law, concerning the carrying out the Reform of the Swiss Coinage.

May 7, 1850.

The Diet of the Swiss Confederation, in accordance with the law for the reform of the Swiss coinage, determines:—

Article 1. The reform of the Swiss coinage, in accordance with the federal law of the 7th May, 1850, shall be carried out by the Federal Council. Any loss that shall arise in melting the cantonal coins shall fall upon the cantons, each in proportion to the quantities which have been struck with their device. Any gain which shall result from the new coinage shall, after deduction of all costs and expenses, be divided among the several cantons, in accordance with the monetary scale of the Confederation of the year 1838.

Article 2. In accordance with the aforesaid law, the following sums and denominations of silver coin shall be struck and put into circulation:—

A.—In Silver.

Pieces.		Current Value.
500,000	5 franc pieces	frs. 2,500,000
750,000	2 „	„ 1,500,000
2,500,000	1 „	„ 2,500,000
2,000,000	½ „	„ 1,000,000
	B.—In Billon.	
10,000,000	20 rapp pieces	„ 2,000,000
12,000,000	10 „	„ 1,250,000
20,000,000	5 „	„ 1,000,000
	C.—In Copper.	
11,000,000	2 rapp pieces	„ 220,000
3,000,000	1 „	„ 30,000
62,250,000		12,000,000

Article 3. The coinage shall proceed in a rateable succession. The Federal Treasury shall make the necessary advances.

Article 4. The coinage may be executed, at the discretion of the Federal Council, either at a Swiss mint or wholly or partially at foreign ones.

Article 5. All Swiss coins at present existing and current shall, within a fixed and definite term, be called in, and, at its expiration, melted, after which date they shall be no longer current. They shall be called in at the rates of the accompanying tariff.

Article 6. The Federal Council will superintend this calling in, and the Federal Treasury will make the necessary advances.

Article 7. These advances consist, in the first place, in the new coinage, and, if more be necessary, in those foreign coins which may be declared a legal tender, fractional parts of which do not find expression in these coins can be delivered in Swiss small change, according to the provisions of the accompanying tariff.

Article 8. The funds for the coinage and for the calling in of the old coins are, if necessary, to be raised by a special and temporary loan.

Article 9. The Federal Council is hereby empowered to contract such a loan to the extent of four million francs of the new currency.

Article 10. This loan is to be repaid from the proceeds of the liquidation of the coin, and of this a separate account is to be kept.

Article 11. The anticipated loss to each canton from the melting down of their coins is to be beforehand approximately estimated. The Federal Council will then enter into negotiations with each canton to cover the anticipated loss pending the definitive account at the termination of the liquidation.

Article 12. This is to be done immediately, and paid, either wholly or in part, in ready money or the bonds of the cantons, in favour of the Confederation.

Article 13. These bonds may run, at successive and equal dates, over a period of ten years. They are to bear interest at 4 per cent., and this rate is to apply to all reciprocal calculations in the liquidation of the coins.

Article 14. The interest due by the cantons on their loss at each rate of conversion will commence from the middle of each appointed period of conversion.

Article 15. The Federal Council may negotiate the cantonal bonds mentioned in Article 12, if required for the purpose of paying the loan on account of the coinage, unless the cantons prefer to redeem them.

Article 16. As soon as the coinage of one portion is completed, its product shall be applied to the conversion of those old Swiss coins which are in circulation.

Article 17. If the sum of the new coinage does not suffice for the conversion of the old, what is requisite to this end shall be supplied in accordance with Article 8 of this law.

Article 18. The conversion of the cantonal coinage shall proceed, without reference to its origin, throughout the cantons in accordance with the directions of the Federal Council.

Article 19. A period of two months shall be appointed, and announced at a proper time, for the conversion of each issue, at the commencement of which the current value of each of the old coins shall be legally determined by the accompanying tariffs of conversion, but still without application to antecedent contracts.

Article 20. After the lapse of the first month of the period of conversion, it is obligatory on no one, with the exception of the above-named officers of the Confederation, to accept any of the old descriptions of coin then called in for conversion at any rate whatever. After the expiration of the second month those sorts are entirely, even at the above-named offices, deprived of all current value.

Article 21. The new currency shall come into operation at the time of the issue of the last portion of the new coin. Till that time the following estimation of all foreign current coin shall be established at all the public offices of the Confederation from the 1st June, 1850:—

The Brabant or Crown thaler	$40\frac{1}{2}$ batzen.
The 5 franc piece	$35\frac{1}{2}$ „
The South German guilder	15 „
The Austrian 20-kreutzer piece	6 „
The French 2-franc piece	14 „
„ 1 „	7 „
„ $\frac{1}{2}$ „	$3\frac{1}{2}$ „

but if a sum of five francs is paid in these three last denominations in one payment, they shall be taken as $35\frac{1}{2}$ batzen. The denominations of the new Swiss coinage shall be created in the same manner as the French silver ones of corresponding designations. The Swiss gold and silver coins, as well as the silver small change of the old coin, are to be taken at the rate of the annexed tariff of conversion; the Swiss billon and copper coins, at their present value. This valuation, however, is not to apply to the interest or re-payment of any existing investment of capital, debts, or contracts of the Finance Ministry of the Confederation.

Article 22. The cantonal laws in reference to these coins will remain in force until the introduction of the new currency, so far as their determinations shall not conflict with those of the present law. In those cantons where it shall be necessary to make any temporary enactment in reference to the period of transition, the cantonal governments shall have power to do so, but these enactments must be previously laid before the Federal Council for their approval.

Article 23. From the date of the new currency coming into operation, it shall be employed in all the legal papers and accounts between the cantons and the Confederate (or central) Government.

The Swiss Federal Council determines—

That the above federal law concerning the carrying out the reform of the Swiss coinage, together with the tariffs of conversion, be communicated to every cantonal government, and at the same time be published in the Federal Gazette, and received into the official collection of the Confederation.

In the name of the Federal Council.

Federal President, H. Druey,

Berne, 10th May, 1850. Chancellor of the Confederation, Schiess.

Tariff of Conversion.

Gold coin, base and pure silver coin, together with silver small change, shall, in convertion, be taken at their old current rates according to the following valuations. They are so be redeemed by coins of the new currency, the franc to be taken as 71 rapps of old currency; fractional parts which cannot be expressed in the new coinage can be made up in current small change of the old.

In Gold.

	Francs.	Rapps.
Doubloon of Berne (other varieties in proportion)	16	20
Ducat of Berne	8	10
10 franc piece of Lucerne	10	12
20 ditto of Geneva	14	20
10 ditto, ditto	7	10

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In Silver.

	Francs.	Rapps.			Francs.	Rapps.
10 franc piece of Geneva - -	7	10				
4 franc piece (new dollar) of all cantons	4	05	7	pieces	28	40
2 gulden piece of Zurich - - 1 gulden in proportion.	3	25				
2 gulden piece of Bâsle - - 1 $\frac{2}{3}$ $\frac{1}{2}$, in proportion.	3	04	7	„	21	30
2 franc piece of all cantons - -	2	02	7	„	14	20
21 batz piece of Neufchatel - -	1	90				
1 franc piece of all cantons - -	1	01	7	„	7	10

Silver Small Change.

	Rapps.
8 batz piece ($\frac{1}{2}$ gulden) of Zurich - -	80
5 batz piece of all cantons - - -	50
15 schilling piece of Glavis - - -	45
4 batz piece, $\frac{1}{4}$ gulden, Zurich - -	40
15 kreutzer piece of St. Gall - - -	37
10 schilling piece of Lucerne - - -	32
$2\frac{1}{2}$ batz piece of all cantons - - -	25

Billon and Copper Coins

Will be calculated in the new currency and exchanged for the new coinage only.

	Cents.			Francs.	Cents.
3 batz piece of Bâsle - - - -	42	71	pieces	30	0
2 ditto, Zurich, Uri, and Schweitz - -	28	71	„	20	0
5 schilling piece of Lucerne - - -	23	10	„	2	30
6 kreutzer ditto of St. Gall - - -	20	10	„	2	10
1 batz ditto of all cantons, except Glavis and Neufchatel - - - - -	14	71	„	10	0
1 batz piece of Neufchatel and 3 schilling piece of Glavis - - - - -	13	10	„	1	30
$\frac{1}{2}$ batz piece of all cantons, except Neufchatel -	07	71	„	5	
$\frac{1}{2}$ batz piece of Neufchatel - - -	06	20	„	1	30
1 schilling of Zurich - - - -	05	40	„	2	25
1 ditto of Lucerne - - - -	04	20	„	0	90
1 ditto of Glavis - - -	04	25	„	1	0
3 soldi piece of Ticino - - - -	09	10	„	0	90
1 kreutz piece of all cantons - - - -	03	10	„	0	35
2 rapp piece of all cantons - - -	02	10	„	0	28
1 blutzger piece of Grisons - - - -	02	20	„	0	45
$\frac{1}{2}$ kreutzer piece of all cantons - - -	01	20	„	0	35
1 rapp, ditto - - - -	01	10	„	0	14
6 denari piece of Ticino - - -	01	10	„	0	15
3 ditto, ditto, ditto - - - -		10	„	0	07
25, 10, 5, 4, 2, 1 centimes of Geneva, at their nominal value.					

The Federal Council is empowered to place any other coins upon this tariff, and to give them a proportionate valuation.

Gold Coins.

From "A Manual of the Gold and Silver Coins of all Nations." Eckfeldt & D.

Denomination.	Date.	Government.	Weight.	Fineness.	Value.	The degrees better or worse than English Standard.
			Grs.	Thous.	D. C. M.	
Double Pistole -	1793	Berne - -	234	900	9 07 0	W. 0 $1\frac{5}{8}$
Pistole - -	1796	Do. - -	116	901	4 50 1	0 $1\frac{5}{8}$
Ducat - -	1794	Do. - - -	52·5	974	2 20 2	B. 0 $1\frac{1}{2}$
Do. - -	No date	Basle - -	53	943	2 15 2	0 $2\frac{1}{2}$
Pistole - -	1795	Do. - - -	118	891	4 52 8	W 0 $2\frac{1}{2}$
Do. - -	1798	Soleure - -	116	898	4 48 6	0 $1\frac{7}{8}$
Do. - -	1800	Helvetian Republic -	116	897	4 48 1	0 2

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SILVER COINS.

Denomination.	Date.	Government.	Weight.	Fineness.	Value.	The degrees better or worse than English Standards.
			Grs.	Thous.	D. C. M.	dwt.
Ecu - -	1790–94	Zurich - -	390	844	0 88 7	W. 10
Eight batzen -	1810	Do. - -	113	—	1 10 0	„ $5\frac{1}{2}$
Ecu, forty batzen -	1795–98	Berne - -	452	903	0 27 4	„ $22\frac{1}{4}$
Francken -	1797	Do. - - -	122	833		
Do. - -	1811	Do. - -	114			
Five batzen -	1826	Do. - -	67	760	0 13 7	„ 50
Two and a half do. -	1826	Do. - -	31·5	766	0 6 5	„ 38
Batzen - -	1826	Do. - -	31	254	0 2 1	„ 161
Four franken -	1814	Lucerne - -	453			
Ten batzen - -	1812	Do. - -	110	904	0 26 8	„ $5\frac{1}{4}$
Four franken -	1801	Helvetian Republic -	452	900	1 09 6	„ 6
Genevoise, or ecu of 3 liv. - -	1796	Geneva - -	464	868	1 08 5	„ $13\frac{3}{4}$
Twenty-five cent. -	1839	Do. - -	62	252	0 4 2	„ $160\frac{1}{2}$
Ten do. -	1839	Do. - -	49	126	0 1 7	„ $191\frac{1}{2}$
Ten batzen -	1823	Vaud - -	112	900	0 27 1	„ 6
Five do. - -	1813	Do. - - -	63	666	0 11 3	„ 62
Batzen - -	1831	Do. - - -	39	164	0 1 7	„ $182\frac{1}{2}$
Batzen - -	1828	Freyburg - -	40	167	0 1 8	„ $141\frac{1}{2}$
Thaler - -	1763	Basle - -	356	833	0 80 0	„ $22\frac{1}{4}$
Crown - -	1795	Do. - -	412	840	0 93 2	„ $20\frac{1}{2}$
Small piece -	No date	Do. - - -	72	53	0 1 0	„ $209\frac{1}{2}$

EXTRACT from a LETTER of HORACE JOHNSTON, Esq., Secretary of Legation at BERNE.

* * * * * *

Mr. Brown's questions are, "Were there any riots, dissatisfaction, or passive resistance "to the introduction of the new coinage, and whether any inconvenience is found by any "parties yet adhering to the old coins or systems?"

Although the discussions on the subject were long, and the opinions divided, yet, as soon as the law was passed, all the changes determined on were carried into effect without the slightest resistance, and indeed with a facility which astonished the most ardent advocates of the change. In the course of a year the whole coinage in the twenty-two cantons was changed. No such thing as a riot or disturbance took place; and if any dissatisfaction prevailed, it ceased almost immediately after the introduction of the new money. Indeed, a banker told me the other day, that it was extraordinary how soon the people had forgotten the names of the old coins, and that they began counting immediately in the new money. He also added, that the people of the Canton of Berne received the new coins with a *delight* (*empressement*) that *was wonderful*, owing, it is true, to the losses they had often suffered from the old coins. The fact, however, remains the same, viz., that the lower classes made no resistance to the changes in their old money, and found no difficulty in accustoming themselves to the new.

As regards the last question, the whole Confederation has adopted the new coinage, for the federal law *was binding on them all.*

* * * * * * * * * * *

Yours, &c.,
HORACE JOHNSTON.

No. 38.

No. 38. Lombardy.

Austrian Government.

LOMBARDY.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* Lombardo-Venetian Kingdom.

Sent through HER MAJESTY'S MINISTER at VIENNA.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. The Austrian lira: its silver and money value (zahlwerthe) computed according to the standard of convention, or 20-gulden standard, one gulden is equivalent to three Austrian lire, and hence the lira contains $\frac{1}{60}$ Cologne mark fine silver.

Q. 2. What are the subdivisions of such money of account?——

A. The lira is divided into 100 centesimi.

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Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Lire and centesimi are the only legal tenders.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. If 32*l.* sterling are assumed to be equivalent to one Cologne mark of fine gold,* and if the value of gold as compared with silver is assumed to be as 15·5 is to 1, then the value of

1 Austrian lira = 8·258 pence.
1 Austrian centesimo = 0·082 „

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A.	Are equivalent to 1 Cologne mark fine.	Value in English money: £32 = 1 Cologne mark fine gold.
In gold.		
Ducats -	67·944	0·470970 sovereigns.
Sovrano - -	22·931	1·395490 „
½-sovrano - -	45·862	0·697745 „
	Are equivalent to 1 Cologne mark fine.	Value in English money: 536·517 pence to 1 Col. mark fine silver.
In silver.		
Scudo, Thaler - -	10 0	4 sh. 5·652 pence.
½ scudo, 1 gulden piece -	20 0	2 sh. 2·826 „
Austrian Lira, 20 kreuzer piece	60 0	— 8·942 „
½ lira, 10 kreuzer piece	120 0	— 4·471 „
¼ lira - -	240 0	— 2·235 „

In copper.

15 centesimi piece
10 „
5 „
3 „
1 „

from 1 cwt. (Viennese), or 56001·2 gramm., are coined 512 lire of the value of 100 centesimi each.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Yes.

Q. 7. What is the coin of lowest value in common use?——

A. The centesimo.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. No.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The lira Italiana = 100 centesimi.
The lira Milanese = 20 soldi at 12 denari the soldo.

Q. 10. What was its legal value relatively to the present money of account?——

Q. 11. What coins were current, and of what value, in the former money of account?——

A. *Vide* tariff that accompanies enclosed Patent for the Lombardo-Venetian kingdom of the year 1823.

Change of Money.

Q. 12. When did the change take place?——

A. In the year 1823.

Q. 13. What was the cause of the change?——

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. The object was to introduce into the Lombardo-Venetian kingdom the standard of convention in force in the other provinces of the Austrian empire,

* 1 ounce troy = ·133,037 Cologne marks. 1 Cologne mark, fine gold = £31·929.—A. S.

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whilst retaining, however, the decimal division of the unit. And at the same time it was sought to avoid the inconvenience which had arisen from the circulation of different systems of coins, by fixing legally their proportion to the new coin.

Q 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units or in their proportions to each other?——

A. No. Refer to foregoing.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money, or in account keeping?——

A. In every respect.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. More particularly by the commercial classes.

Q 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. No. The object was to harmonize the system with that prevailing in other parts of the monarchy whilst retaining the decimal division.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. No.

Q. 20. In what way was the change effected?——

A. *Vide* patent enclosed herewith.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. *Vide* tariff.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. The new coins were issued simultaneously with the change.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. The circulation of the old coins was allowed concurrently with the new.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. The new coins received old names.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. One hundred Austrian lire were made equivalent to eighty-seven Italian lire, or $113\frac{9}{22}$ Milan lire.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. *Vide* §§ 14, 16, 19, 20, and 21, of the Patent of the year 1823.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. *Vide* patent.

The new system was received on the whole willingly. It met with no resistance, and its introduction did not require to be enforced by compulsory measures.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. Yes. As regards small retail business, the old system continues down to the present day; but the new system gradually gains the upper hand, and the old one is superseded.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. No inconveniences have been felt.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. In Austrian lire.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. In small retail business, the "Lire Milanese" at 20 soldi (12 denari to the soldo) are used. (*Vide* Answer to Question 28.)

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. No; the only impediment in the way of a more rapid change was the force of former habit.

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Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.

2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. The new money, regard being had to the component parts of the province, corresponds in every respect to the rest of the monarchy.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. At the commencement of the century, during the period of the Italian monarchy, there was introduced, together with the decimal system (Lira Italiana), the metrical (French) standard for weights and measures, which is still in force.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

Inasmuch as according to the above statement the decimal system does prevail for weights and measures, these two questions do not require answers.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject. by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. Enclosed herewith are a copy of the Imperial Patent regulating the currency for the Lombardo-Venetian kingdom, dated the 1st November 1823, and a copy of the decree of the ministry of finance, dated the 28th of July 1852, respecting the introduction of a copper coinage.

NOTE.—The patent referred to in the foregoing answers is dated the 1st of Nov. 1823. Its object, as appears by the recitals, was not to introduce a decimal system, such a system being already in force, the unit of which was the "Lira Italiana," equal to the French franc, and divided into 100 centesimi, but to harmonize the currency with that of the rest of the Austrian Empire, retaining the decimal system, and the standard of fineness previously in force. For this purpose a new unit was introduced denominated the "Lira Austriaca," of the value of $\frac{1}{3}$ of the Convention florin or 20 kreutzers. Its weight was $4{\cdot}330\frac{5}{7}$ grammes silver $\frac{9}{10}$ fine. Its value was therefore 86·6 French centimes, and it is declared to be equal in value to 87 Italian centesimi.

Besides the Austrian gold and silver coinage and the "Lira," there were to be coined,—

Gold coin.—Sovereign = 40 lire; $\frac{1}{2}$ sovereign = 20 lire.

Silver coin.—Scudo = 6 lire; half scudo = 3 lire; half-lira; quarter-lira.

Copper.—Soldo = 5 centesimi; 3 centesim piece; centesimo.

These gold and silver coins were to be $\frac{9}{10}$ fine, and $\frac{1}{10}$ alloy, except the quarter-lira, which was to be $\frac{6}{10}$ fine, and $\frac{4}{10}$ alloy.

In this coinage the relative values of fine gold and fine silver are as 15·2875 : 1, being the proportion which in England would give 5*s.* $1\frac{2}{3}$*d.* as the price of an ounce of standard silver.

The following are the clauses of the Patent referred to above:—

14. "The gold and silver coins specified in both parts of the Schedule according to "their legal value shall be a legal tender in our Lombardo-Venetian kingdom in all "payments both public and private, and shall be received by all persons in the discharge "of all debts, both public and private.

16. "It is left to the arrangements of individuals to employ in payments money not "in legal circulation, or to make any special agreement as to the value of the coins com-"prised in the tariff.

18. "From the day of the publication of these Presents the revenue and expenditure "of our Lombardo-Venetian kingdom shall be converted into the new standard. All "the accounts of the public offices shall be kept in that standard, and the new standard "shall be exclusively employed in all public documents.

19. "Private persons may, in their contracts, make use of the new coinage, or of any "of the old coinages. But where no particular coinage is expressed in contracts subse-"quent to the publication of these Presents the legal presumption shall be in favour of "the new coinage, unless there be legal evidence of an intention to use another coinage.

20. "For the legal comparison between the new and the old coinage, it is declared that "100 Austrian lire, 87 Italian lire, $113\frac{9}{3}$ Milanese lire, and $169\frac{5}{6}\frac{9}{4}$ Venetian lire, shall be

"of equal value. For the more ready comparison of the old and new coinage, tables of "reduction are annexed to these Presents, which have been prepared with the greatest "accuracy, and which shall be conformed to in all cases in which public offices have to "make a reduction.

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21. "When, in a contract between private persons, a particular species of coins is "expressed which, at the time of payment, is no longer in circulation, the contract shall "be performed according to the 989th Article of the Civil Code, according to which the "debtor must pay the creditor in the coins most nearly resembling them, and of such "number and sort as to contain the same intrinsic value as the coin expressed had at the "time of the contract."

A. S.

No. 39.

THE TWO SICILIES.

No. 39. Two Sicilies.

Her Majesty's Minister.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* KINGDOM of the TWO SICILIES.

Sent by HER MAJESTY'S MINISTER at NAPLES.

Q. 1. What is the money of account at present established by law?——

A. The ducat, carlin, and grain.

Q. 2. What are the subdivisions of such money of account?——

A. The ducat is equal to - - - 10 carlins.
The carlin „ - - - - 10 grains.
The grain „ - - - - 10 calli.
Therefore the ducat is equal to 100 grains and 1,000 calli.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. All account books are kept in ducats and grains only, though the ducat in silver is seldom seen in payments, which are always made in Neapolitan dollars worth 12 carlins or 120 grains.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The ducat is the highest and the grain the lowest unit. If the exchange were calculated at 600 Neapolitan grains to a pound sterling British, which was formerly considered to be the rate of exchange, the ducat of 10 carlins would be equal to 40 pence, and the grain to about 2-5ths of a penny, but as the par of exchange is now considered to be of 578 for a pound sterling, the ducat would be worth 41½ pence, and the grain somewhat higher in proportion.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. There are no gold coins at present current by law, or in general circulation. The Mint issued formerly gold coins of various sizes upon which the value for which they were issued was stamped, but not being legal tender the Government refuses to receive them in payment of duties or taxes, and they are, therefore, not in circulation. The silver coin consists of dollars commonly called piastres of 12 carlins, or 120 grains, half-dollars of 60 grains, pieces of 4 carlins, 3 carlins, 2 carlins, 1 carlin, and half a carlin, which latter are scarce. If these silver coins are calculated at the exchange of 600 grains for the pound sterling the result would be as follows:—

	s.	d.
The dollar or piastre, equal to - -	4	8
The half-dollar „ - - -	2	4
The carlin of 10 grains „ - -	0	4⅔

There are also copper coins in common use, which, however, are not money of account beyond the fractional part of two carlins. They are as follows:—Pieces of 5 grains or half a carlin, pieces of 4 grains, of 3 grains, of 2½ grains, of 2 grains, of 1½ grain, 1 grain, and of half a grain, called tornese; there are also pieces called 3 calli, but they are no longer coined. The grain was in former times divided into 12 calli,—the word calli being a corruption of cavalli; the 3 calli piece was therefore the fourth of a grain; but since the decimal system has been adopted, the 3 calli piece goes for 2½ calli, still remaining the fourth part of a grain.

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Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. The grain is the lowest denomination of money of account in common use.

Q. 7. What is the coin of lowest value in common use?——

A. The tornese is the lowest coin in general use, but the 3 calli pieces are still used by the poorest classes.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. No complaints whatever are heard on this subject.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The present system of coinage has been so long in use that it is impossible to give any precise information with respect to the system that previously existed.

(*Questions* 10 *to* 33 *not answered.*)

Weights and Measures.

Q. 34 Are the weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. They are so in theory, but not in practice. The new division is of recent date, and has no connexion with the decimal division of money which preceded it.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?

A. The lower classes have not yet adopted the new system for weights and measures, but generally adhere to the old one. The Decimal System, however, is followed by the Custom House authorities in levying duties.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. No inconvenience has arisen to the public at large.

(*Question* 37 *not answered.*)

Note.—The monetary unit established by the Law of 20th April, 1818, is the ducat, composed of 22·943 grammes of silver $\frac{9}{10}$ths fine, and therefore equal in value to 4·25 francs.

By the same law there were to be gold coins of 3, 15, and 30 ducats, gold being to silver as 15·208 : 1, equivalent to a price of English standard silver of 62*d.* per ounce.

A. S.

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Her Majesty's Minister.

No. 40.

TUSCANY.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *as far as regards the* GRAND DUCHY OF TUSCANY.

Sent by HER MAJESTY'S MINISTER at FLORENCE.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. The money established by law for keeping books should be florins.

Q. 2. What are the subdivisions of such money of account?——

A. Subdivision, cents of one hundred to the florin.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Although the law orders as above, accounts are kept (even by government offices) in *lire*, *soldi*, and *denari*, of which 20 soldi make one lira, and 12 denari one soldo, and bills are drawn out and payments and receipts recorded in this denomination of coin.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The highest of said unit of a lira is worth in English money, reckoned at par, eight-pence sterling; and the lowest, the denaro (imaginary coin, whereas the lowest coin in circulation is the quattrino, worth 4 denari,) forms in English money one thirtieth of a penny.

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Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. Gold Coins.

	lire.	soldi.	den.		at par.		
80 florin piece	133	6	8	=	£4	8	10
Ruspone	40	0	0	=	1	6	8
Gigliato or zecchino	13	6	8	=	0	8	10
Silver coins.							
Dena	10	0	0	=	0	6	8
Francescone	6	13	4	=	0	4	5
Mezza dena	5	0	0	=	0	3	4
Franceschino	3	6	8	=	0	2	$2\frac{1}{2}$
Testone, or 3 paul piece	2	0	0	=	0	1	4
Fiorino	1	13	4	=	0	1	$1\frac{1}{4}$
2 paul piece	1	6	8	=	0	0	$10\frac{3}{5}$
Lira	1	0	0	=	0	0	8
Mezzo fiorino	0	16	8	=	0	0	$6\frac{2}{3}$
Paolo	0	13	4	=	0	0	$5\frac{1}{3}$
Mezza lira	0	10	0	=	0	0	4
Cinquino ($\frac{1}{4}$ florin)	0	8	4	=	0	0	$3\frac{1}{3}$
Mezzo paolo	0	6	8	=	0	0	$2\frac{2}{3}$
Copper coin and mixed metal.							
Due crazie piece	0	3	4	=	0	0	$1\frac{1}{3}$
Due soldi	0	2	0	=	0	0	$0\frac{4}{5}$
Crazia	0	1	8	=	0	0	$0\frac{2}{3}$
Soldo	0	1	0	=	0	0	$0\frac{2}{5}$
Duetto	0	0	8	=	0	0	$0\frac{4}{15}$
Quattrino	0	0	4	=	0	0	$0\frac{2}{15}$

There are moreover the following Roman silver coins admitted in circulation established by law, from the scudo romano, or colonnato worth lire 6. 6. 8., down to the papetta, or two Roman paul piece, worth lire 1. 5. 4.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. All the above coins are in common use.

Q. 7. What is the coin of lowest value in common use?——

A. The quattrino.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. None except the crazie of old coinage of the Medici, which are so worn out that we can scarcely distinguish them from old thin pieces of pewter.

Former Money of Account and Coin.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The old money of account was scudi (which, like the denaro, is an imaginary coin), lire, soldi, and denari.

Q. 10. What was its legal value relative to the present money of account?——

A. One scudo (Fiorentino) legally valued at seven lires present currency.

Q. 11. What coins were current, and of what value, in the former mouey of account?——

A. All the present coins were current (except the fiorino and the coins, gold and silver, composed of it, as also its fractions), and at the same value.

Change of Money.

Q. 12. When did the change take place?——

A. The partial change took place in 1826.

Q. 13. What was the cause of the change?——

A. The cause which influenced the legislature was to bring about the decimal system, as proclaimed in the annexed law.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. By the complexity in the accounts.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. To do away with the anomaly and inconvenience of the use in accounts of an imaginary unit, and because the general popular custom was inclined to the 10 paul piece or francescone.

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Q. 16. Were the inconveniences (if any) which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping? ——

A. As above.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. As above.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. The change from the scudo to the lira, as unit in account keeping, was caused as above, and not by any desire to assimilate the currency to that of any neighbouring state; but the law of 1826 was undoubtedly proclaimed for the evident purpose of bringing about a change towards a decimal currency, but averseness to change and the apathy both of the people and the government, allowed the law to be simply a dead letter.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. See answer to Query 18.

Q. 20. In what way was the change effected?——

A. The change of scudo to lire was tacitly and by degrees adopted, except in certain districts, in rural account keeping.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. No change took place in the relative value of coins previously in circulation.

Q. 22. Were any and what new coins issued before, and in contemplation of, simultaneously with or after, the change?——

A. Only the florin, and pieces composed of florins, or fractions of florins, which circulate without any opposition or inconvenience being felt.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. See answer to Query 11.

Q. 24. Were any old names given to new coins, or new names to old coins? ——

A. None.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. They were.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money, tolls, pontages, duties, &c., belonging to private persons, to municipal or other public bodies, or to the state, the right to which was acquired under the old system, or any other fixed engagements? ——

A. No change having taken place in the relative value of the coin no provision was required.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? Or did the old system continue in use for any and what time in accounts or in popular language?——

A. The change from the scudo to the lira as unit for accounts was gradually adopted; but, as before stated, the law intended to bring about the decimal system, which, however, was never enforced or attended to, although a penalty was tacked to the nonobservance of the law.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?

A. Answered above.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?

A. For the above reason no inconvenience is felt.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. Merchants and bankers keep all their accounts in lires.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. No answer required, being explained above.

Q. 32. Was the change, at the time of its introduction, unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. Nothing of the kind has occurred under the above circumstances.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. No answer required.

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Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?

A. Weights and measures are not divided decimally. The old system is still adhered to with no innovation.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the division of money?——

A. Requires no answer, as no alteration took place in coins or weights.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. No answer required, as there is no decimal form established for either coins or weights.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reason for its adoption, and the mode in which it has been carried into effect?——

A. During the French occupation, and whilst Tuscany was incorporated in the French Empire as a department, by order of Napoleon I., the decimal French system was adopted, both as to coins and weights and measures The Tuscan mint coined five-franc pieces, and a tariff was issued fixing the relative correspondence between French and Tuscan coins in every species of current coin, and the same in weights and measures. Accounts and books were kept as formerly, in lires, but before our courts of law everybody was obliged to mention the corresponding amounts in French decimal denominations. In the outset some ill-humour was created, but it gradually subsided, and no visible inconvenience resulted thereupon. On the return of the Grand Duke in 1814, all the French laws on the application of the decimal system were repealed and the old system restored. Annexed is the decree of 1826, which proclaims the defects of the actual system and the necessity of founding transactions on a decimal system.

(Translation.)

Notification.

The Imperial and Royal Council, in execution of the Sovereign orders, contained in the note of the Imperial and Royal Secretary of the Finances, of the 16th June last, notifies to the public, the following royal resolution:—

His Imperial and Royal Highness having turned his sovereign attention to the monetary system in force in his most prosperous States, has observed that the two bases of the said system, the *paul* and the *lira*, not only cause the currency and the method of account keeping commonly adopted to depend on different elements, but also hinder the adoption of the decimal system which cannot be put in practice without bringing both of them, and, at the same time, the general system of currency, to a new type of monetary unity.

His said Imperial and Royal Highness has also considered that the institution of the new monetary unity may be formed in such a manner as, without difficulty to render the whole of the former coinage still admissible, both in monetary transactions and payments.

In pursuance of such reflections His Imperial and Royal Highness has determined to order as follows:—

I. The royal mint shall issue a new silver coin, under the name of *fiorino*, of the value of one hundred of the present quattrini, which will thus be the fourth part of the current piece of ten pauls, and will become the sole and only basis of the new monetary system.

II. This coinage, offering all the requisite divisions and subdivisions of the florin, will effectually introduce a decimal series, which will promote the convenience of commerce.

III. A new gold coin shall also be issued of the value of eighty florins, His Imperial and Royal Highness reserving to himself to indicate at a future period his intention respecting the other multiplications in gold of the new florin.

IV. The royal mint shall continue the coinage of the gold coins known by the name of ruspone and zecchino, subject, however, to all the laws, usages, and customs relative to the same.

V. Every declaration of money in notarial instruments and judicial acts shall, from the 1st of January 1827, be made in the new florins and their centesimal fractions, or, at least, if mentioned by the name of the coin hitherto used, their relative value in florins shall likewise be specified. The chancellors, sub-chancellors, actuaries, and other officers of the tribunals, notaries, procurators, etc., who may transgress this rule shall incur the fine of twenty lire for every transgression, half of the fine to be applied to the benefit of the

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registry office, and the other half to the benefit of the hospital of the place where such transgression has been committed, or of the nearest existing hospital.

VI. The Royal Council will make known to the public in detail, and in order to avoid misunderstandings, the description of every new coin to be issued by the royal mint, in the form required by the existing laws.

From the Imperial and Royal Council,
July 10, 1826.

(Signed) V. A. Puccini.
(Signed) L. Pelli-Fabbroni.

No. 41. Netherlands.

Sir J. H. Turing, Bart.

No. 41.

THE NETHERLANDS.

Answers to Queries proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage *so far as regards* the KINGDOM OF THE NETHERLANDS.

By Sir James H. Turing, Bart., Her Majesty's Consul at Rotterdam.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. Florins, cents, and half cents.

Q. 2. What are the subdivisions of such money of account?——

A. One florin contains one hundred cents, or two hundred half cents.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. No other denominations of money of account than the above mentioned are practically used in expressing or recording payments and receipts.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The highest unit of such money of account, namely one florin, estimated at the par of exchange of twelve florins to the pound sterling, is equal to one shilling and eightpence, and the lowest unit, being one half cent, is estimated at the same exchange to be equal to one tenth part of a penny.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. The coins current by law and in general circulation are the following:—

Silver.

The piece of two florins and a half:
Value in money of account, two hundred and fifty cents.
„ coins of United Kingdom, four shillings and twopence.
The piece of one florin:
Value in money of account, one hundred cents.
„ coins of United Kingdom, one shilling and eightpence.
The piece of fifty cents:
Value in money of account, fifty cents.
„ coins of United Kingdom, tenpence.
The piece of twenty-five cents:
Value in money of account, twenty-five cents.
„ coins of the United Kingdom, fivepence.
The piece of ten cents:
Value in money of account, ten cents.
„ coins of the United Kingdom, twopence.
The piece of five cents:
Value in money of account, five cents.
„ coins of United Kingdom, one penny.

Copper.

The piece of one cent:
Value in money of account, one cent.
„ coins of United Kingdom, one fifth part of a penny.
The piece of one-half cent:
Value in money of account, one half cent.
„ coins of the United Kingdom, one tenth part of a penny.

Q. 6. Are coins representing the lowest denomination of money of account, in common use?——

A. The lowest coin, the one half cent copper piece, and representing the lowest denomination of money of account, is in common use.

Q. 7. What is the coin of lowest value in common use ?——

A. The half cent copper piece is the coin of lowest value in common use.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society ?——

A. The lowest coins in common use are not complained of by any classes in society as being either inconveniently low or inconveniently high.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system ? What were its subdivisions ?——

A. The money of account before the introduction of the present system was in many instances inconveniently various and provincial, the basis of the whole nevertheless resting on the value of the florin, containing twenty stivers or one shilling and eightpence sterling.

The subdivisions of the florin in account were stivers and pennings; the stiver containing sixteen pennings.

With reference to the above-mentioned varieties of money of account, it may be sufficient for illustration to mention that in the Province of Zealand books and accounts were kept in pounds Flemish, schellings, and groats.

The pound Flemish was equal to six florins, or - 10*s.* sterling.
The schelling „ „ thirty cents, or - 6*d.*
And groat - „ „ two and a half, or - ½*d.*

In like manner in some other provinces a peculiar system in respect to money of account prevailed, but the cases are now of so old a date that the memory of them has nearly passed away, and details cannot be furnished.

Q. 10. What was its legal value relatively to the present money of account ?——

A. I cannot say more than that all was based on the value of the florin of one shilling and eight pence sterling.

Q. 11. What coins were current, and of what value, in the former money of account ?——

A. The coins in current use were the following, many of which had in the course of circulation undergone great mutilation and consequent depreciation, being in some instances hardly distinguishable by any outward symbol.

Of national gold coin there were these in use :—

		£	*s.*	*d.*	
Ducats - - - -	value	0	9	9	sterling.
Half ducats - - - -	„	0	4	10½	„
Ryder - - - - -	„	1	3	4	„
Half ryders - - - -	„	0	11	8	„
Williams - - - -	„	0	16	8	„
Half Williams - - - -	„	0	8	4	„

The silver coins in use consisted of :—

Ducatoons - - - -	„	0	5	3	„
Zealand rix dollars - - -	„	0	4	4	„
Subdivided into half rix dollars - -	„	0	2	2	„
„ „ quarter „ - -	„	0	1	1	„
„ „ eighth „ - -	„	0	0	6½	„
* See Reply 23. Florins - -	„	0	1	8	„
* Subdivided into half-florins - -	„	0	0	10	„
* „ quarter - -	„	0	0	5	„
Pieces of thirty stivers - -	„	0	2	6	„
„ twenty-eight stivers - -	„	0	2	4	„
„ twelve and a half - -	„	0	1	0½	„
„ six stivers - - -	„	0	0	6	„
* „ two stivers - - -	„	0	0	2	„
* „ one stiver - - -	„	0	0	1	„

Copper.

Doits—8 of which were equal to - - -	0	0	1	„

Change of Money.

Q. 12. When the change take place ?——

A. The change was made and commenced in 1822.

Q. 13. What was the cause of the change ?——

A. The cause of the change of money (by which, I presume, is meant the money of account) arose in a great measure from the universally prevailing opinion that the Decimal System would be beneficial for arithmetical purposes, tending essentially to greater unity, and to the simplification and abridgement of financial reports and calculations of every description, being also considered to be arithmetically more correct than the fractional system.

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Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency ?——

A. The change was caused by the inconveniences and confusion which were experienced by the state of the previous currency.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other ?——

A. The previous currency, though from long standing understood by all classes was replete with inconveniences and essentially objectionable.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping ?——

A. Both in paying money so multifarious in point of coinage as well as in the keeping of accounts, where some provinces adhered to their own peculiar system of keeping accounts, inconveniences could not fail to be felt.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt ?——

A. The inconveniences alluded to were felt by all classes generally.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries ; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law ?——

A. The change was no doubt in part owing to the desire of assimilating the currency to that of neighbouring countries, and in an especial degree promoted by the example given by the French nation, who had successfully adopted the decimal principle in monies, weights, and measures. It had not been rendered familiar by its adoption as a money of account or of exchange until established by law.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a nondecimal division ?——

A. A preference of the decimal division above the nondecimal division was universally felt and understood, but the difficulty of execution was long anxiously and maturely debated.

Q. 20. In what way was the change effected ?

A. The change was eventually accomplished n the way provided by the constitution, namely, by the Executive Government submitting to the States General a sketch of law (projet de loi) accompanied by explanatory memoranda showing the object and advantages of the proposed measure, which, after passing through committees of the Upper and Lower Chambers of the States General, were finally adopted by a large majority in both houses, and then embodied into a law with the approval of the King, and promulgated by his Majesty's sanction.

Q. 21. Were the relative values of any of the coins previously in circulation changed ?——

A. Some of the coins in previous use were altogether withdrawn, and those detailed in Reply 5 came to be the only legal tenders.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change ?——

A. No other coins have been issued since the issue of those designated in Reply 5.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new ?——

A. All the silver coins were withdrawn, excepting those marked *, particularized in Reply No. 11. Of the gold coins the Williams, of the value of 16*s.* 8*d.* sterling, and the Half Wlliams, of 8*s.* 4*d.* sterling, were allowed to circulate for some time longer.

Q. 24. Were any old names given to new coins, or new names to old coins ?——

A. No. See, for particulars of new coins, Answer No. 5.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies ?——

A. The lower denominations of monies of account in the old system were absorbed in the new by the general denomination of cents.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new ? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements ?——

A. No provision of this nature was made, as is shewn by the accompanying translations of the laws enacting the change. See Reply No. 37.

Q. 27. Was the change in the money of account gradual or immediate ? Was it optional or compulsory ? If compulsory, how and by what penalties was it enforced ? Was it effectually enforced ? or did the old system continue in use for any and what time in accounts or in popular language ?——

A. The change was immediate and compulsory, being enforced by law ; all accounts, unless kept in conformity with the law, being inadequate before

courts of justice, and not recognized by any public authorities; Government leading the way by keeping all state accounts according to the new system, and requiring the public to observe the same rule in all transactions with the state.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. The above reply, No. 27, answers this query.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. All running bills of exchange were reduced to the new system by simply adopting cents instead of stivers, at the reduction of five cents to the stiver, the standard of florins remaining unaltered; thus, for example, a bill of exchange which had been drawn under the former system for 1,200 florins and 15 stivers, would, if due after the enactment of the new system, be paid with 1,200 florins and 75 cents, and all other accounts, bank notes, &c. on the same principle.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. This question is replied to by the previous statement, that only one system now prevails.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. This question is replied to by the previous statement, that only one system now prevails.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. The change was accomplished without any symptoms of unpopularity, and no such feeling is now perceptible, nor does the change cause any uneasiness.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions?——

A. The new money (coin) is more convenient than the old, being more suitable from its greater simplicity and sufficient abundance, as well for paying and receiving large and small sums, as in keeping accounts in large and small transactions.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. Weights and measures are divided decimally, and had preceded the decimal division of money several years.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. No inconveniences have been perceptible, nor were any complaints made on this subject.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. The people very readily accommodated themselves to the new system, arranging with each other the retail transactions to mutual satisfaction, complaints, if any, being suppressed as soon as the system was known to be the law of the land. It cannot be denied, however, that the old system of weights and measures is still very general in all transactions of a retail description; and although this is contrary to the present law, it will nevertheless take a long time completely to eradicate the custom.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

The accompanying translation of the law of 18th December 1845, and of the Decree of 14th February 1846, serve to show the measures pursued by the Netherland Government for effecting the withdrawal of the old coins from circulation, and the substitution in lieu of the same of a circulating medium

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Netherlands.

Sir J. H. Turing, Bart.

to serve temporarily while the exchange was in progress, and these public documents are essential to prove by what simple means the whole coinage was remodelled and made available throughout the realm without causing interruption or inconvenience.

British Consulate,
Rotterdam, 31st March 1856.

JAMES H. TURING.

Staatsblad, No. 90.

LAW of 18th December 1845, relative the EXCHANGE of the Provincial or General State COINS still in CIRCULATION.

WE, William II., by the grace of God, &c. &c. &c., to all who may see or hear these presents read, greeting. Be it known:—

That having taken into consideration the necessity of Our being legally empowered to cause all the silver coins coined previous to the promulgation of the Law of 28th September 1816 (Staatsblad, No. 50), to be cancelled, and at the same time to introduce, in the lieu thereof, under proper guarantees, a temporary auxiliary coin:

Having heard the Council of State, and with the consent of the States General, We have seen fit, and by these presents do see fit and ordain:—

Article I. At the periods, and in the manner We shall see fit to appoint, all the silver coins coined previously to the Law of 28th September 1816 (Staatsblad, No. 50), including those which, by Articles 12 and 17 of the same Law, are still in circulation, shall, whether at once or progressively, be annulled, after opportunity shall have been given for exchange of the same.

Article II. As long as all the coins afore-mentioned shall not have been withdrawn under the guarantees appointed on Our behalf according to the following articles, and in the form prescribed by Us, there may be issued mint notes not less in value than one florin to the collective amount which may be deemed necessary.

Article III. No such mint notes as aforesaid are to be issued, excepting in exchange for a like nominal value of the silver coin mentioned in Article I.

The mint notes so issued may progressively, but at the latest on the last day of December 1847, be exchanged for silver or gold coin.

Article IV. At the same rate as mint notes are issued, an equal quantity of new silver coin, or a quantity of the coin described by Article I., equal in nominal amount to the mint notes issued, and besides for supplement of deficiency as much mint coin or fine silver or gold in bars in proportion as may be agreed upon with the Directors of the Netherland Bank to be required for establishing the new coin, which has to be represented by mint notes, must be transferred to the keeping of the Netherland Bank.

On the mint notes the directors of the Netherland Bank must express that the above rule has been complied with.

The difference which may be occasioned by the real re-coinage, must, when such appears, be immediately regulated and accounted for with the Netherland Bank.

Article V. The coin or gold and silver thus transferred to the keeping of the Netherland Bank, will remain in that keeping, or may be transferred by the directors of that Bank to the Royal Mint at Utrecht for the purpose of fining and re-coinage.

Article VI. As long as all the mint notes have not been withdrawn, or an amount of new coin be not in the hands of the Netherland Bank sufficient for the withdrawal of the mint notes still in circulation, none of the coins originating from the specie or gold and silver transferred for account of the State by the Netherland Bank may be delivered from the Royal Mint, excepting to the Netherland Bank.

Article VII. At the end of every month the head of the Department of Finance reports to the General Chamber of Account the amount of mint notes issued or withdrawn.

The withdrawn mint notes are to be accounted for to the General Chamber of Account, and annulled in the presence of two members of said Chamber; and announcement be made successively of the amount issued and withdrawn of such notes in the Staats Courant.

Article VIII. The mint notes issued by virtue of the present law must, until the period to be fixed for their being withdrawn, be taken by everyone as a legal means of payment equivalent to ready money, for the sums expressed on the body of the same. Anyone imitating, falsifying, or criminally circulating or importing mint notes, is punishable with permanent hard labour, and in modified cases with temporary hard labour, in as far as judgment shall have been given in the province of Limburg, and in the other provinces of the State, with the punishments which are in use in lieu of permanent or temporary hard labour.

Article IX. The mint notes which, within two years after the time appointed for their withdrawal, are not presented for that purpose, fall into prescription.

Article X. No Netherland coins coined according to the Law of 28th September 1816 (Staatsblad, No. 50) and subsequent Laws will be received at the State Treasury if they be in any way altered, and thus falsified, mutilated, clipt, or exteriorly injured, and no one can be obliged to receive such altered, falsified, mutilated, or injured coins.

We reserve the right to apply the rules mentioned in this article at convenient periods, temporarily also to some of the silver coins described in Article I. which may require it.

Article XI. The new coins or such of the old to which We may apply the reservation mentioned in the concluding part of the preceding Article, presented in an altered, falsified, mutilated, clipt, or injured state at the Government offices, may be detained, and with a proof of such detention be sent to the Council and Chief Masters of the Mint for examination, and being declared to be in such state, must be cut through, and in that condition be returned to those presenting them.

These presents to be inserted in the Staatsblad, &c. &c. &c.

The Hague, 18th December 1845.

WILLIAM.

By Order of the King.

The Director of the King's Cabinet,

A. G. A. van Rappard.

Issued on the 21st December 1845.

The Director of the King's Cabinet,

A. G. A. van Rappard.

Decree of 14th February 1846, relative to the Withdrawal and Exchange of Ducatons and Rix-Dollars or Pieces of Two Florins and Fifty Cents, with the Subdivision of each, in execution of the Law of 18th December 1845. (Staatsblad, No. 90.)

We, William II., by the grace of God, &c. &c. &c.

Having seen Article I. of the Law of 18th December 1845 (Staatsblad, No. 90), which provides that at the periods and in the manner to be appointed by Us, all silver coins coined before the enactment of the Law of 28th September 1816 (Staatsblad, No. 50), including those which by virtue of Articles 12 and 17 of said Law are still in circulation, shall, whether at once or progressively, be annulled, after opportunity shall have been given for exchange of the same;

On the Report of Our Minister of Finance of 13th instant, No. 114/111 G.S., have seen fit and do ordain:—

Article I. On the 8th of March next following are to be annulled all whole and half ducatoons or silver ryders, rix dollars, or pieces of two florins and fifty cents, with the half and quarter pieces of the same, after from Tuesday the 3rd to Saturday the 7th of the same month, opportunity shall have been given for the exchange of said old coin.

Article II. For the exchange of the same, other silver coins or mint notes shall be used in conformity with the Law of 18th December 1845 (Staatsblad, No. 90), in the form appointed by Us.

Article III. Besides at the Netherland Bank, the exchange is to take place at the offices of the agents of the Treasury, who, in case of being insufficiently provided with coin, are authorized to issue certificates at five day's date in the manner prescribed by Article 2, payable at their offices or at Amsterdam, at the Netherland Bank, at the option of those interested, on presenting the withdrawn coin for exchange, and to be expressed in the certificates.

Article IV. Our Minister of Finance is authorized to adopt the needful measures for the exchange expressed in the preceding Articles, as also to promote the same at the offices of the collectors of taxes, by taking over, up to, and including the 7th of March next ensuing, as far as their cash permits, the coins withdrawn from circulation by this decree.

Our Minister of Finance is charged with the execution of this decree, copy of which is to be transmitted for information to the General Chamber of Account, and to the Council and Chief Masters of the Mint, and inserted in the Staatsblad.

The Hague, 14th February 1846.

WILLIAM.

The Minister of Finance,

Van Hall.

Issued on the 16th February 1846.

The Director of the King's Cabinet,

A. G. A. van Rappard.

No. 42.

Answers to Queries proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* KINGDOM OF THE NETHERLANDS.

By James Annesley, Esq., Her Majesty's Consul at Amsterdam.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. Guilder, cent, and half-cent.

Q. 2. What are the subdivisions of such money of account?——

A. One guilder is equal to 100 cents, or 200 half-cents.

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Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Guilders, cents, and half-cents.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

	s.	d.	
A. Highest unit, one guilder, equal to -	1	8	Calculated at the Exchange of 12 fl. per £ sterling.
Lowest, half-cent, equal to $\frac{1}{10}$ part of a penny.			

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. The gold standard coin is abolished.

	s.	d.	
The silver coins are:—			
The Rÿksdaalder ($2\frac{1}{2}$ fl. piece) equal to -	4	2	Exchange at 12 fl. per £ sterling, as above.
Gulden (standard) - - -	1	8	
Half-gulden - - - -	0	10	
25-cent piece - - - -	0	5	
10-cent piece - - - -	0	2	
5-cent piece - - -	0	1	
The copper coins are:—			
The Cent - - - - -	0	$\frac{1}{5}$	
Half-cent - - - -	0	$\frac{1}{10}$	

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. Yes.

Q. 7. What is the coin of lowest value in common use?——

A. The half-cent.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. No complaint is made with regard to their being too high or too low in value. The silver five-cent pieces are not much liked; their size is too small to be convenient for the labouring classes.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. Gulden, stuiver, and penning.

1 guilder - -	=	20 stivers.
1 stiver - -	=	16 pennings.

Q. 10. What was its legal value relatively to the present money of account?——

A. The guilder had the same value; the stiver or 16 pennings is equal to five cents.

Q. 11. What coins were current, and of what value, in the former money of account?——

	Value in the former money of accounts.			
	Guilders.	Stivers.	Pennings.	
A. The ducaton - - -	3	3	0	Silver.
3 gulden - - - -	3	0	0	
Daalder - - -	1	10	0	
Achtentwentig - - -	1	8	0	
Gulden - - -	1	0	0	
Zeeuwsche rÿksdaalder - -	2	12	0	
$\frac{1}{8}$ „ (pietje) -	0	6	8	
Hollandsche rÿksdaalder -	2	10	0	
Dertiendhalf - - -	0	12	8	
Schelling - - - -	0	6	0	
Zesthalf - - -	0	5	8	
Dubbeltje - - - -	0	2	0	
Stuivertje - - -	0	1	0	
Ten-gulden piece - -	10	0	0	Gold
Five-gulden piece - -	5	0	0	
Duit - - -	0	0	2	Copper.

Besides many old provincial silver coins, indeed too numerous to specify.

Change of Money.

Q. 12. When did the change take place?——

A. The change in account took place on the 1st January 1821. The change in the currency (coins) took place at different periods five or six years ago.

Q. 13. What was the cause of the change?——

A. The deterioration of the coin by unlawful practices (clipping) and the greater convenience of the Decimal System.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. Great confusion and inconvenience were experienced from having too many coins of different (practical) value.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. A great many.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money, or in account keeping?——

A. Principally in paying and receiving money. The present system of keeping accounts in guldens and cents is far more convenient than the former one.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. The inconveniences were felt by all classes, but chiefly by the labouring classes.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. The change was caused by example. The excellent working of the Decimal System in France was generally acknowledged; the new mode of calculation had been rendered familiar by instruction at the public schools. The change in accounts, and afterwards in the coinage, was only adopted after the same had been established by law.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a nondecimal division?——

A. Most decidedly.

Q. 20. In what way was the change effected?——

A. By law.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. Yes; the value of the pieces in stivers were reduced to cents by multiplying each stiver by five.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with or after, the change?——

A. The change in accounts was, as already stated, effected in 1821, and the coinage was changed five or six years ago.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. All the old coins were at different times called in and new coins substituted; for instance, the daalders (pieces of 1½fl.) were called in to be exchanged on a certain day for new guilder pieces, and pieces of 50 cents, and in this manner the whole coinage was gradually changed; the pieces not called in remained in circulation simultaneously with the new issued money until their turn came round.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. The gulden (the standard) alone retained its old name, although the pieces themselves were changed for new ones. No new names could be given to the old coins, as they were all withdrawn.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. No; in the old accounts the pennings were the small figure, 16 to a stiver, although one penning could not be paid, as the only copper coin in circulation was the duit, equal to two pennings. In the new accounts the half-cent, 10 to a stiver, is the lowest denomination; the half-cent piece is in circulation; the former pennings were imaginary, whilst the half-cents are real.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. The provisions were not difficult; the gulden remained the same; the stivers were as stated reduced to cents by multiplying them by five. With regard to tolls, etc. of less than one stiver, some arrangement was effected by reducing the number of duiten (two pennings) as nearly as possible to cents; for instance, a toll of two duiten (four pennings) was paid with 1½

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cent,—this was, of course, a loss to the public of a quarter cent; a toll of three duiten (six pennings) by two cents, and one of four duiten was paid by $2\frac{1}{2}$ cents.*

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. The change in money of accounts was from a date fixed, and in all public transactions compulsory ordinances were issued at the time specifying the penalties for noncompliance. The old system was entirely discontinued, and the new system effectually enforced. In popular language (among the lower classes only), the old denominations are still made use of, but rarely.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. The change was willingly adopted. The old system has ceased; it did not then, nor does it now, continue in use concurrently with the new.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. The inconvenience is little, and only to a trifling amount, and is principally confined to the lower orders. For instance, a greengrocer sells his cabbage at so many *duits* and is paid in *cents;* even these instances are becoming every day of more rare occurrence. In accounts, bank notes, or bills of exchange, there is no such concurrent use.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. The books are kept in guldens and cents.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. Most effectually.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. It was rather unpopular with the unlettered and old; this unpopularity has been transitory. I am not aware of the change having caused any commotion; uneasiness it may have caused, as the Dutch are for the most part always opposed to innovations of every kind.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages,

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions?——

A. Certainly more convenient. Formerly large sums of money were often paid in ten different sorts of coin, which caused much trouble and loss of time. At present the payments can only be made in the new coin above mentioned; in small transactions, the convenience is also very great; the old small silver coins were numerous and badly divided, whilst the new 25 cents and 10-cent pieces and the copper coins are very convenient.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. Yes; it accompanied the decimal division in account (1st January 1821).

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. The division of weights and measures correspond with the division of money.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. The division of money corresponding with the division of weights, the case does not arise.

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* Tolls of 2 duiten = $1\frac{1}{4}$ cents, paid by $1\frac{1}{2}$ cents. Increase, 20 per cent.
„ 3 „ = $1\frac{7}{8}$ cents, „ 2 „ „ $6\frac{2}{3}$ per cent.

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J. Annesley, Esq.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. The medicinal (apothecary) weight was left unchanged for fear of accidents. I have endeavoured to procure copies of Ordinances issued in 1821, the period at which the compulsory change in the money of accounts was effected, but have not been able to do so. There is no doubt that penalties more or less stringent were attached to a noncompliance; in fact, the law remaining unchanged, the penalties are in force up to the present hour.

These Ordinances are more likely to be obtained at the Hague than at Amsterdam.

JAMES ANNESLEY,
Her Majesty's Consul.

No. 43.

No. 43.
Portugal.

Her Majesty's Minister.

PORTUGAL.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* KINGDOM OF PORTUGAL.

Sent by HER MAJESTY'S MINISTER at LISBON.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. In Portugal accounts are kept in reis, with the following notation:— 1.000:000$000 (one thousand contos or millions of reis); the symbol $ following the place of thousands; a colon (:) the place of millions (contos); and a period (.) the place of thousands of millions.

Q. 2. What are the subdivisions of such money of account?——

A. The rei is the lowest unit. In ordinary language a milreis (1$000) and a conto (1:000$000) are spoken of, but these words mil and conto are also ordinarily used as numerical nouns.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. No other denomination of money of account besides that of reis is practically used in recording payments and receipts; but in expressing them it is usual, where the amount is less than a moidore (4$800), to state them in cruzados ($400), cruzados novos, or pintos ($480), quartinhos (1$200), testoons or tostões ($100), and vintems (20 reis). Larger amounts are expressed in the moidore and its multiples, and sometimes in pounds sterling (libras), at the rate of 4$500.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The value of the highest unit of the money of account practically used in expressing payments and receipts is 1*l.* 1*s.* 3*d.* (the moidore), of the lowest $\frac{4}{175}$ of a penny (five reis). In recording payments and receipts the rei, $\frac{4}{875}$ of a penny, is the only unit.

Present Current Coins.

Q. 5. What are the coins current by law and in general circulation, and what is their respective value in the money of account, as well as in coins of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. The coins current by law at present are the following:—

Gold.

Corõa, 10$000	=	£2	4	$5\frac{1}{3}$	=	$2\frac{2}{9}$ sovereigns.
Meia Corõa, 5$000	=	1	2	$2\frac{2}{9}$	=	$1\frac{1}{9}$ „
Quinto de Corõa, 2$000	=	0	8	$10\frac{2}{9}$	=	$0\frac{4}{9}$ „
Decimo de Corõa, 1$000	=	0	4	$5\frac{1}{3}$	=	$0\frac{2}{9}$ „
Peça, 8$000	=	1	15	$6\frac{1}{3}$	=	$1\frac{7}{9}$ „
Meia Peça, 4$000	=	0	17	$9\frac{1}{6}$	=	$0\frac{8}{9}$ „
Soberano, 4$500	=	1	0	0	=	the English sovereign.
Meio Soberano, 2$250	=	0	10	0	=	the half-sovereign.

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Silver.

	s.	d.
Cinco tostões, $500 - - - =	2	$2\frac{2}{3}$
Dois tostões, $200 - - - =	0	$10\frac{2}{3}$
Tostão, $100 - - - - =	0	$5\frac{1}{3}$
Meio tostão, $050 - - - =	0	$2\frac{2}{3}$

Comparing these coins with those of Great Britain, as by law established, the piece of

	s.
5 tostões will be equivalent to -	2·19 nearly.
Of 2 tostões - - -	·876 of a shilling.
1 tostão - - - -	·438 ,,
Meio tostão - - - -	·219 ,,

This calculation is based upon the weight of pure silver in the shilling (80·727 grains), (see M'Culloch, Art. Coins), and the weight of the like metal in the piece of 5 tostões (11·4583 grammes) as deduced from the legal gross weight of the piece 12·5 grammes, and the fineness of $\frac{11}{12}$.

Besides the following, which were called in by a law passed on 29th July 1854, but permitted to continue current until 31st March 1857.

Silver.

Corõa, 1$000 - - =	4 $5\frac{1}{3}$	=	4·38 shillings.
Cruzado Novo, $480 - =	2 $1\frac{3}{5}$		
12 vintens, $240 - =	1 $0\frac{4}{5}$		
6 vintens, $120 - - =	0 $6\frac{2}{5}$		
Tostão (old), $100 - =	0 $5\frac{1}{3}$		
3 vintens, $060 - - =	0 $3\frac{1}{5}$		
$\frac{1}{2}$ tostão (old), $050 - =	0 $2\frac{2}{3}$		

It is not practicable to give the corresponding value of the last six coins in English coins on account of the want of uniformity in their weight.

Copper.

Vintem - - - - -	$1\frac{1}{2\frac{1}{5}}d.$	
Meio vintem, or 10 reis - -	$\frac{1}{2\frac{3}{5}}$	= one halfpenny and $\frac{1}{5\,0}$ of a penny.
Cinco reis - - -	$\frac{1}{5\,0}$	= one farthing and $\frac{1}{1\,0\,0}$ of a penny.

Patacão, or 40 reis $2\frac{2}{2\frac{2}{5}}d.$, mixed metal.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. No coin representing the lowest denomination of the money of account exists.

Q. 7. What is the coin of lowest value in common use? ——

A. The coin of lowest value in common use is the piece of five reis.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. There are trifling inconveniences resulting to the poor from the lowest coin in common use being too high in value; but, whether it proceeds from ignorance or from patient endurance, they make no complaint.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The present system of money of account is the same which has always prevailed.

Q. 10. What was its legal value relatively to the present money of account?——

A. See No. 9.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. See No. 9.

Change of Money.

Q. 12. When did the change take place?——

A. The change of money is not yet completely carried out. It was originally enacted by law, bearing date 24th of April 1835; and subsequent laws passed on the 15th February 1851, and 29th July 1854, on the subject of the issue of new coin, followed the same principle of decimal division. Copies of these laws are annexed.

Q. 13. What was the cause of the change?——

A. The cause of the change is the desire to bring the coinage into conformity with the decimal system of the money of account.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. It was not caused by the inconveniences, confusion, and complexity in the state of the previous currency.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units or in their proportions to each other?——

A. There were inherent inconveniences in the previous currency from the circumstance that some of the coinage were according to a decimal, others according to a duodecimal, system.

Q. 16. Were the inconveniences (if any) which caused or promoted the change inconveniences felt in paying and receiving money, or in account keeping?——

A. These inconveniences were not felt practically either in paying or receiving money, or in account keeping. Indeed to some classes of the community the variety was a convenience, as dispensing in many instances with the necessity of using copper in small payments.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. See the previous answer.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. The change is not caused by any desire to assimilate the currency to that of the neighbouring country.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. It is stated to be caused altogether by an abstract preference for a decimal division of money over a non-decimal one.

Q. 20. In what way was the change effected?——

A. The carrying out of the change is effected by the introduction of new coins into circulation, and by calling in at a fixed period a portion of the old coinage.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. During the progress of the change the relative value of two of the coins previously in circulation (the peça and its submultiple the meia peça) has been changed. This alteration, however, as will be more particularly explained in the answer to the last question in this return, was occasioned by other causes than those connected with the decimal division of the coin.

Q. 22 Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. During the progress of the change the following new coins have been issued in contemplation of and simultaneously with it, viz.:—

Gold.

Corõas de ouro of - - -	5$000
Meias corõas of - - -	2$500
Gold pieces of - - -	1$000

Silver.

Corõas of - - - -	1$000
Meias corõas of - - -	$500
Pieces of - - - -	$200
New pieces of - - -	$100

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. The following coins have been withdrawn from circulation, viz.:—The corõa of gold of 5$000, and the meia corõa of gold of 2$500, coined under the law of 24th April 1835. And the following coins are called in by the law of 29th July 1854:—

The corõa of gold of 5$000, and its submultiples, coined under the law of 15th February 1851.

The corõa of silver of 1$000, and its submultiples, coined under the law of 24th April 1835.

The cruzado novo of $480, and its submultiples.

The old coins of $100 reis, and 50 reis. But the period for carrying out this provision, fixed originally at two months for Lisbon, and four months for the provinces, from the date of publication of the law, was successively prolonged until the 2d February 1855, 31st January 1856, and 31st March 1857.

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Portugal.

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Q. 24. Were any old names given to new coins, or new names to old coins?——

A. The names of corõa and meia corõa, given by the laws of 24th April 1835 and 15th February 1851 to gold coins of the value of 5$000 and 2$500 respectively, are by the law of 29th July 1854 given to coins of the respective value of 10$000 and 5$000.

The silver coins denominated according to the last-mentioned law, pieces of five testoons (cinco tostoẽs) were styled in the law of 24th April 1835 meias corõas.

Qs. 25—33. The monies of account not being changed these questions require no answer.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. The weights and measures actually in use are not divided decimally.

It is, however, provided by law that the French metrical system shall be established, and this measure is to take effect at the close of the year 1862.

The weight of the coins issued under the law of 29th of July 1854 is also fixed according to this system.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. The low value of the unit of the money of account obviates any inconvenience which might arise from the division of weights and measures not corresponding with the divisions of money.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. It is doubtful whether any retail dealer in Lisbon, having transactions with the poorer classes, gives himself the trouble of reconciling the difficulties arising from the incommensurability of the weights and measures with the division of coins, or whether his poor customers are aware of any loss or inconvenience from them. In those commodities which are sold by weight or measure it is quite possible so to adjust the price as that the dealer shall not receive more than his reasonable profit.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. The general want of statistical information in Portugal makes it difficult to furnish satisfactory answers on many of the subjects of the present inquiry. Indeed in their Parliamentary discussions on questions relating to the monetary system the entire absence of arguments of this practical nature is remarkable, even where it appeared more particularly applicable, and might be thought, à priori, to be easily attainable.

Notwithstanding the various enactments already referred to for the issue of gold and silver coinage the former is hardly ever seen in circulation, English sovereigns being employed all but exclusively in the specie transactions both of the cities and provinces. The value assigned to the sovereign when made current by law in the law of 1846, of 4$500, while it had the advantage of being a multiple of the silver coinage issued in conformity with the law of 24th April 1835, has occasioned much fluctuation and confusion in the value of the other gold coins in circulation. It became necessary in the following year to increase the representative value of the peça (see the answer to the question No. 20) from 7$500 to 8$000 (*i.e.* from 1*l.* 13*s.* 4*d.* to 1*l.* 15*s.* 6$\frac{1}{3}$*d.*), and all the legislation herein referred to subsequent to the law of 24th April 1835 has been called for by the consequences of this original false estimate.

But as the details of these measures, and the inquiries on which they were based, seem to be foreign to the object desired by Her Majesty's Commissioners for inquiring into decimal coinage, any further allusion to them is deemed unnecessary.

Only in a single instance in the course of the debates in the Chambers on these subjects was the topic of the division of the coin brought forward, and that for the purpose of recommending the continuance of coin of the duodecimal system, in concurrence with that of the decimal system, on the ground of the former being more convenient for the uses of common life from the greater number of divisions in the number 12.

The convenience of the Portuguese system of money of account in recording payments and receipts is generally acknowledged, as well by official, scientific, and commercial men as by private individuals in their ordinary transactions; and this circumstance will in some measure account for the general absence of practical investigation and information concerning it, since it is commonly only when difficulties present themselves that the ingenuity of practical and scientific men is exerted for the purpose of inquiring into the subject matter in which these difficulties occur, and in suggesting remedies for them. It will therefore perhaps be sufficient to point out one trifling difference between this money of account and that of other countries using the decimal system, namely, the use of a single denomination, that of reis, instead of two, as francs and centimes, or dollars and cents, as in France and the United States.

The documents of which copies are annexed to this return are as follows:—

Law of 24th April 1835.
Law of 15th February 1851.
Law of 29th July 1854.
Law of 13th December 1852.
Law of 24th April 1854.

Note.—The following is a summary of the principal provisions of the laws referred to above:—

1. By the law of 24th April 1835,—

All coins coined after the 30th June 1835 were to be decimal.

Both gold and silver coins were to be a legal tender. Silver $\frac{11}{12}$ fine to be coined at the rate 7$750 per marc. Gold of the same fineness at the rate of 120$000 per marc.

This gives the relative value of gold to silver as 15·48 : 1, being the proportion which in England would give 5*s.* 1*d.* as the price of standard silver.

1$000 in silver = 29·608 grammes in weight = 6·03 francs (French) in value.

1$000 in gold = 1·912 grammes in weight = 57·44 pence (English) in value.

English sovereign = 4$178 in gold.

The coins were to be,—

Silver -	-	1$000.	$500.	$200. $100.
Gold -	- -	5$000.	2$500.	

These were to circulate concurrently with the coins previously in circulation.

2. By the law of the 15th of February 1851,—

The quantity of gold in 5$000 was reduced from $2\frac{2}{3}$ oitavas to $2\frac{1}{2}$ oitavas, *i. e.* by $\frac{1}{16}$ or $6\frac{1}{4}$ per cent. This gave the relative value of gold to silver as 16·513 : 1, being the proportion which in England would give 4*s.* 9*d.* as the price of an ounce of standard silver.

1$000 in gold = 1·793 grammes in weight = 53·44 pence in value.

English sovereign = 4$456 in gold.

Gold coined under the law of 24th April 1835 was to be current at 2$000 per oitava.

3. By the law of 13th December 1852 the French metrical system of weights and measures was introduced, but the coinage was not affected.

4. The law of the 29th July 1854 was occasioned by the change in the relative commercial values of gold and silver operating on the double standard in force, and driving the silver out of circulation.

Its object was to introduce the English system, by which gold is the sole standard and the only legal tender above a limited amount, and by which silver coins are tokens circulating at a value above their intrinsic value, but are only a legal tender for a limited amount.

By this law any person may send gold to the mint to be coined, paying a seignorage of 1$000 per kilogramme or 1·7735 per thousand.

Silver and copper are to be coined and issued only for and by the State.

Silver is to be a legal tender to the amount of 5$000 only.

The following changes were made in the weight of the coins:—

1$000 in gold was to be = 1·7735 grammes in weight, *i. e.*=53·28 pence in value.

This gave the English sovereign, weighing 7·988 grammes, equal to 4$504. It was made a legal tender for 4$500, while of the weight of 7·981 grammes.

25 grammes of silver ($\frac{11}{12}$ fine) were to be coined into 1$000.

At this rate a pound troy of silver, at the English standard of $\frac{37}{40}$, would be coined into 66·896 shillings, instead of as in England 66 shillings.

Many of the coins previously in circulation were to be called in; they were to be legal tenders for two months in Lisbon and four months in the provinces, and received at Government offices for one month afterwards.

A. S.

No. 44.
Russia.

Her Majesty's Minister.

No. 44.

RUSSIA.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* EMPIRE OF RUSSIA.

(Transmitted by HER MAJESTY'S MINISTER at ST. PETERSBURGH.)

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. The unit of money which is used in Russia as the standard of value is the silver ruble, with its subdivisions.

Q. 2. What are the subdivisions of such money of account?——

A. The silver ruble is divided into 100 parts, each of which bears the name of copeck; each copeck is subdivided into half copecks and quarter copecks.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. The money of account employed in payments only bears, as indicated in Question 1, a single denomination, that of silver ruble; consequently all accounts, payments, and in general transactions in silver of all sorts, both with the Crown and between individuals, are only expressed in this one unit of money.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The silver ruble forms the highest unit of money of account. It contains 4 zolotnicks 21 dolis, *i. e.* 405 dolis of fine silver of the lawful weight established in Russia; *i. e.* it contains 278 grains of fine silver. (N.B. 1 poud contains 40 (Russian) pounds, 1 pound = 96 zolotnicks, and 1 zolotnick = 96 dolis.) Its value in British money varies according to the course of exchange, generally within the limits of 37 to 39 pence.

The lower unit of money, the copeck, represented by a copper coin, is, as mentioned above, the hundredth part of a ruble, and consequently corresponds in value to 4·05 dolis of fine silver. The lowest subdivision of the copeck, the quarter copeck forms the $\frac{1}{400}$ part of a ruble, and therefore expresses a value of 1·0125 dolis of fine silver.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. The coins at present current in the empire consist of the following gold, silver, and copper coins, struck after designs approved of by His Majesty the Emperor:—

Gold Coinage.

The Half Imperial.—Its value, in respect to the unit of money, *i. e.* in silver rubles, = 5·15; it is, therefore, equivalent to 5 rubles 15 copecks. The relation between the value of gold and silver is generally fixed in Russia as 1 to 15·45. The legal standard of half imperials is fixed in Russia at 88 in 96, taking the subdivision of the Russian weight, *i. e.* a zolotnick of gold must contain 88 dolis of fine metal and 8 dolis of alloy. This standard is altogether analogous to the standard of English sovereigns; it is a little higher ($1\frac{6}{10}$ dolis) than that of the French 20-franc pieces, which are of the standard of 86·4 (according to the Russian division).

Each half imperial must contain 1 zolotnick 39 dolis,—that is, 135 dolis of fine gold.

The weight of a half imperial with the alloy is $147\frac{3}{11}$ dolis, and each pound of alloyed gold must therefore contain 62 half imperials 2 rubles $88\frac{8}{9}$ copecks, at the standard of 88.

The following Table indicates the principal relations between the half imperial and the English sovereign; these relations, expressed in Russian weight, and according to Russian standard, will allow of a better appreciation of the real value of the former:—

——	Weight of Alloyed Metal contained in the Coin.	Standard.	Weight of the Fine Metal contained in the Coin.	Value expressed in Silver Rubles.
Russian $\frac{1}{2}$ Imperial -	$147\frac{3}{11}$	88	135	5·15
English Sovereign -	$179\frac{3}{100}$	88	$164\frac{42}{100}$	$6{\cdot}27\frac{23}{1000}$

Silver Coinage.

1. The ruble, which is the unit of money, and is divided into 100 copecks.
2. The poltinnick = 50 copecks or 0·50 of a ruble.
3. The tchetwertak, or piece of 25 copecks = 0·25 of a ruble.
4. The dwougriwenny, or piece of 20 copecks = 0·20 of a ruble.
5. The griwennick, or piece of 10 copecks = 0·10 of a ruble.
6. The piatachek, or piece of 5 copecks = 0·05 of a ruble.

The standard of all these different species of silver coins, that of the ruble as well as of the odd money, is fixed at $83\frac{1}{3}$ (in each 96 parts of the Russian division); it is inferior to that of the French 5-franc coin, which, according to Russian weight, is of the standard of $86\frac{4}{10}$ dolis; the Russian standard is, however, superior to that of the Austrian and Prussian dollars, whose standard, according to the above weight, is 80 dolis for an Austrian and 72 dolis for a Prussian dollar.

Each ruble must contain 4 zolotnicks 21 dolis, or 405 dolis of fine silver; and, in conformity with this proportion, the odd silver coins which, as we have seen form the subdivisions of the ruble, ought to contain, of fine silver:—

The poltinnick	=	2	zolotnicks	$10\frac{1}{2}$	dolis, *i. e.*	$202\frac{1}{2}$	dolis.
The tchetwertak	=	1	„	$5\frac{1}{4}$	„	$101\frac{1}{4}$	„
The dwougriwenny	=					81	„
The griwennick	=					$40\frac{1}{2}$	„
The piatatchek	=					$20\frac{1}{4}$	„

The weight of a silver ruble with the alloy is equal to 4 zolotnicks $82\frac{11}{96}$ dolis.

The weight of a poltinnick = 2 zolotnicks 41 dolis.

„	tchetwertak	=	1	„	$20\frac{1}{2}$ „
„	dwougriwenny	=			$93\frac{1}{5}$ „
„	griwennik	=			$46\frac{2}{5}$ „
„	piatchek	=			$23\frac{3}{10}$ „

In general 100 silver rubles must contain 5 pounds 6 zolotnicks of silver with alloy, according to the above-mentioned standard.

The above is sufficient, with the knowledge of the real amount of metal in each of these coins, to determine the value which corresponds to each of them according to the rate of exchange of the English coinage.

Copper Coinage.

The copper coinage, indicating a value in silver, has been struck in Russia since the 7th February 1849 at the rate of 32 silver rubles per poud of copper; it bears a stamp conformable to the designs approved of by His Majesty the Emperor. Its subdivisions are:—

A piece of	5	copecks	=	0·05	rubles,	weight	6	zolotnicks	0 dolis.
„	3	„	=	0·03	„	„	3	„	$57\frac{3}{5}$ „
„	2	„	=	0·02	„	„	2	„	$38\frac{2}{5}$ „
„	1	„	=	0·01	„	„	1	„	$19\frac{1}{5}$ „
„	$\frac{1}{2}$	„	=	0·005	„				$57\frac{3}{5}$ „
„	$\frac{1}{4}$	„	=	0·0025	„				$28\frac{4}{5}$ „

Observation.—Besides the above-mentioned coins there are also some old coins, struck at different periods, which have not been withdrawn from circulation, viz.:—

A.—*Gold Coinage.*

The Imperial = 10 rubles 30 copecks, or 10·30 silver rubles. Its standard is the same as that of the half imperial, but it contains twice the weight of fine gold, besides the corresponding weight of alloy.

B.—*Silver Coinage.*

Struck between the 1st May 1834 and the 5th May 1841, and containing, according to the regulation of the Government, a quantity of fine silver and alloy in proportion to its nominal value, and of the same standard as the present silver coinage:—

1. Piece of a ruble and a half = 1 ruble 50 copecks, or 1·50 rubles; it contains 6 zolotnicks $31\frac{1}{2}$ dolis of fine silver.
2. Piece of 30 copecks = 30 copecks, or 0·30 rubles. It contains 1 zolotnick $25\frac{1}{2}$ dolis of fine silver.
3. Piatialtynny or piece of 15 copecks = 0·15 rubles; amount of fine silver $60\frac{3}{4}$ dolis.

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C.—*Copper Coinage.*

(*a.*) Struck in accordance with the dispositions of the Ukase of the 1st June 1832, at the rate of 36 rubles of assignation per poud of copper.

This coinage was of four kinds:—

The grivna formerly represented 10 copecks of assignation, and contained 10 zolotnicks 64 dolis of copper.

The piatak formerly represented 5 copecks of assignation; its weight = 5 zolotnicks 32 dolis.

The grosch formerly represented 2 copecks of assignation; its weight 2 zolotnicks $12\frac{8}{10}$ dolis.

The copeck formerly represented 1 copeck of assignation; weight 1 zolotnick $6\frac{4}{10}$ dolis.

As long as this coinage remains in circulation, the following nominal value is to be attached to it, in order to introduce unity into accounts:—

A grivna = 3 copecks = 0·03 rubles.
A piatak = $1\frac{1}{2}$ copecks = 0·015 „
A grosch = $\frac{1}{2}$ copeck = 0·005 „
A copeck = $\frac{1}{4}$ copeck = 0·0025 „

(*b.*) Coinage struck in accordance with the dispositions of the Imperial Manifesto of the 1st July 1839, at the rate of 16 silver rubles per poud of copper; viz., pieces of 3, 2, 1, $\frac{1}{2}$, and $\frac{1}{4}$ copecks.

The "billon" coinage is not struck in Russia, and is not taken there.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. The copeck and its subdivisions, established by law, *i. e.* $\frac{1}{2}$ and $\frac{1}{4}$ copecks are represented by coins in general circulation.

Q. 7. What is the coin of lowest value in common use?——

A. The coin of lowest value mentioned above (Question 5) is copper, and represents the $\frac{1}{400}$ part of a ruble, or $\frac{1}{4}$ of a silver copeck.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. The circulation of the Russian gold, silver, and copper coinage presents no inconvenience.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. Before the introduction of the present system the money of account was the ruble of assignation, 3·5 times less than the present silver ruble. It was divided like the silver ruble into 100 copecks, and each copeck was subdivided into 2 diéniéjky, and each diéniéjky into 2 polouschki.

Q. 10. What was its legal value relatively to the present money of account?——

A. The value of the former ruble of assignation which was in circulation before the introduction of the present system relatively to the value of the present silver ruble was as 100 : 350.

All accounts, contracts, and engagements, both of the Crown and between individuals, were made, up to the introduction of the silver money of account, in rubles of assignation.

Q. 11. What coins were current and of what value, in the former money of account?——

A. The same gold, silver, and copper coins which are in circulation at present having a fixed relation to the ruble, were also current before the introduction of the present system, but the calculation was made by taking as a basis the ruble and copeck of assignation; so that the value of the coinage in assignation money was,—

Gold.

			Assignation. r.	c.
An imperial,	containing 10·30 silver rubles, worth	- -	36	5
A half imperial,	„ 5·15 „	- -	18	$2\frac{1}{2}$

Silver.

Piece of a ruble and a half,	containing 1·50 silver rubles, worth	-	5	25
A ruble	„ 1·00 „	-	3	50
Piece of 75 copecks	„ 0·75 „	-	2	62
A poltinnick	„ 0·50 „	-	1	75
A piece of 30 copecks	„ 0·30 „	-	1	5
A tchetwertak	„ 0·25 „	-	0	$87\frac{1}{2}$
A dwougriwenny	„ 0·20 „	-	0	70
A zloty	„ 0·15 „	-	0	$52\frac{1}{2}$
A griwennick	„ 0·10 „	-	0	35
A piatatchek	„ 0·05 „	-	0	$17\frac{1}{2}$

The copper coinage representing the fractional divisions of the ruble had the following nominal value in assignation :—

The grivna corresponded to		10	copecks of assignation.
A piatak	,,	5	,,
A grosch	,,	2	,,
A copeck	,,	1	,,
The diéniéjka	,,	$\frac{1}{2}$	,,
The poloutchka	,,	$\frac{1}{4}$	,,

Change of Money.

Q. 12. When did the change take place?——

A. The change took place in 1840, in consequence of the Supreme Manifesto of the 1st July 1839 relative to the regulation of the monetary system in the empire.

Q. 13. What was the cause of the change ?——

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency ?——

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other ?——

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping ?——

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt ?——

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries, and if so had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law ?——

A. 13—18. The cause of this change was the necessity of putting an end to the rise in the value of paper money (assignation) which had begun to take place in several parts of Russia, owing to different circumstances, and which threatened to give it, contrary to the original intention, a pre-eminence over the silver which forms the fundamental coinage of the empire.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division ?——

A. The former, as well as the present coinage, was founded on the decimal system.

Q. 20. In what way was the change effected ?——

A. The change was effected by the following arrangements of the Government :—The unit of money was fixed in silver ; the assignations were withdrawn from circulation, as no longer corresponding with the actual division of the unit of money ; all the gold, silver, and copper coins which were in circulation in the empire were converted into value in silver.

Q. 21. Were the relative values of any of the coins previously in circulation changed ?

A. The modification effected in the relative value of the coins in their fixed relation to the ruble, *i. e.* the unit of money, has been mentioned above.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change ?——

A. No new coins were struck either before, or during, or after the period of the modification of the monetary system, except the copper coins expressing sums in silver, the old copper coinage having a direct relation only with the ruble of assignation, the divisions of which it represented.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new ?——

A. None of the previous coins were withdrawn from circulation on the occasion of the introduction of the new monetary system. On the contrary, they all remained in circulation except the copper coinage, which was to be abolished in proportion as the new copper coinage was issued.

Observation.—In accordance with the disposition of the Supreme Ukase of the 22d June 1845, the platina coinage, which had been struck in Russia in pieces of 3, 6, and 12 silver rubles, was withdrawn from circulation ; to effect which a term of six months was assigned. But this abolition had nothing to do with the introduction of the new system.

Q. 24. Were any old names given to new coins, or new names to old coins ?——

A. All the coins preserve their previous names.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies ?——

A. According to the general relation of the old ruble to the new, which was as 100 : 350, the silver copeck was valued at $3\frac{1}{2}$ copecks of the old copper coinage. In general as the coins of inferior denomination were copper, expressing only parts of the ruble, no difficulty occurred in the establishment of the relation between the old and new coinage.

No. 44.
Russia.

Her Majesty's Minister.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c., belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?

A. The Supreme Manifesto of the 1st July 1839 fixed terms for the introduction of the change, which was to be effected simultaneously all through the empire, and which, being a governmental measure having the force of a law, admitted of no exception, and was to be obligatory on every one. Nor did the putting into execution of it necessitate any compulsory measure neither was there need of having recourse to any penalty.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. The two systems only existed simultaneously during the term fixed by the Government.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. The relation between the old and new coinage being established in the proportion of 100 to 350, the transfer of accounts from one system to the other could be effected without difficulty.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. In arrangements between individuals, as well as in the affairs of the Crown, the new system is universally adopted. In the language of conversation and in settling accounts between individuals the denominations of the old system are still sometimes used; this is, however, only the case in certain distant provinces of the empire and among individuals of the lower class.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. The change in the monetary system has caused no discontent.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. The new system reckoned in silver thus answers entirely the proposed aim, since by it the most fractional calculations can be expressed.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. No.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. No inconveniences have been found to arise from this.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. As there exists no relation between the division of money and that of weights and measures, and as the latter are not at all divided according to the decimal system, consequently the articles of consumption do not adopt the latter system of division, so that neither loss nor profit can arise therefrom to the poor classes.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. No answer.

No. 45.

No. 45.
Russia.
E. Morgan, Esq.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* EMPIRE OF RUSSIA.

By EDWARD MORGAN, Esq., Treasurer of the BRITISH FACTORY, St. Petersburg.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. Silver rubles and copeaks.

Q. 2. What are the subdivisions of such money of account?——

A. One hundred copeaks equal one ruble.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. No: two only, the ruble and copeak.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. 1 silver ruble = 3*s.* 2*d.* sterling.
A. 1 copeak = 0·38*d.* „

Present current Coins.

Q. 5. What are the coins current by law, and in eneral circulation, and what is their respec tive value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

(At 38*d.* per silver ruble.)

	Russian.		*d.*	English.		
Gold.						
Imperial = silver rubles	10·30 =	1*l.* 12*s.*	7·4	1*l.* = silver rubles		6·31·58
Half imperial „	5·15 =	16	3·7			
Quarter „	3·09 =	9	9·42			
Silver.						
Silver ruble	1·50 =	4	9	5*s.*	„	1·57·89
„	1 =	3	2			
Copecks	75 =	2	4·5	2*s.* 6*d.*	„	78·94
„	50 =	1	7			
„	30 =		11·4	1*s.* 0*d.*	„	31·58
„	25 =		9·5	6*d.*	„	15·79
„	20 =		7·6			
„	15 =		5·7			
„	10 =		3·8			
„	5 =		1·9			
Copper. „	10 =		3·8	1*d.*	„	2·63
„	5 =		1·9			
„	3 =		1·14	0½*d.*	„	1·32
„	2		76			
„	1 =		38	0¼*d.*	„	·66
„	0½ =		19			
„	0¼ =		095			

Q. 6. Are coins representing the lowest denomination of money of account, in common use?——

A. Yes.

Q. 7. What is the coin of lowest value in common use?——

A. One quarter of a copeak, or polushka.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. Their use is confined to the lowest classes.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. Banco rubles and copeaks.

Q. 10. What was its legal value relatively to the present money of account?——

A. Two sevenths of the present currency, say b.r. 3.50 = s.r. 1.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. The coins were the same as the present ones, and they circulated at an agio of from 250 to 300 per cent.

No. 45.
Russia.

E. Morgan, Esq.

Change of Money.

Q. 12. When did the change take place?——

A. In 1839.

Q. 13. What was the cause of the change?——

A. To avoid agio.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. The variations of the agio were the sole inconveniences.

Q. 20. In what way was the change effected?——

A. By imperial ukase.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. Copper was re-coined, otherwise no changes in the coins.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. New copper was issued.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. The old copper was gradually withdrawn. Platina, which was valued above its intrinsic worth, was withdrawn, and ceases to be a currency.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. Gradual and optional.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. They still continue in use concurrently.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. No inconvenience results.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. In the new or silver currency.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. Most of the lower orders and many of the native merchants in the interior of the country keep accounts in the old currency, and quotations of goods are very frequently given in Banco currency.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes or society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. No.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?——

1st. In paying and receiving—(*a*) Large Sums. (*b*) Small sums.
2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. From being of a higher denomination it is more convenient generally.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. Weights and measures are not decimally divided.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. A scale of weights and measures to correspond with the decimal currency would doubtless have its advantages.

Q. 36. How is a decimal division of money reconciled with a nondecimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. Custom prevents any inconvenience being felt.

General Query.

No. 45. Russia.

E. Morgan, Esq.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.——

A. I do not know of any documents which would assist the present inquiry. The money is simple, and of easy management. The decimal calculator (a portable frame with beads running on wires), is in universal use in Russian shops, and is employed throughout the empire for arithmetical computation.

ED. MORGAN,
Treasurer of the British Factory.

St. Petersburgh, 24th March (o.s.) 1856.

No. 46.

No. 46. Greece.

C. W. Merlin, Esq.

GREECE.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* KINGDOM OF GREECE.

Sent by HER MAJESTY'S MINISTER at ATHENS.

Present Money of Account.

Q. 1. What is the money of account at present established by law ?——

A. The drachme (Δραχμὴ).

Q. 2. What are the subdivisions of such money of account ?——

A. The drachme is divided into 100 parts called lepta (λεπτὰ).

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations ?——

A. Two denominations only are used, the drachme and lepton.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom ?——

A. The value of the drachme is $8\frac{1}{2}d.$ (say eightpence and $\frac{53}{100}$), and that of the one-lepton piece is about one third of a farthing, being the $\frac{1}{2812}$ part of a pound sterling.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal ?——

Greek Currency.

		s.	d.
A. Gold.—The otho, value 20 drachmes	=	14	$2\frac{3}{4}$
Silver.—The five-drachme piece	=	3	7
The one-drachme piece	=	0	$8\frac{1}{2}$
The half-drachme piece	=	0	$4\frac{1}{4}$
The quarter-drachme piece	=	0	$2\frac{1}{8}$
Copper.—The ten-lepta piece, value	$\frac{10}{12}$ of a penny.		
The five-lepta piece, „	$\frac{5}{12}$ „		
The two-lepta piece, „	$\frac{1}{6}$ „		
The one-lepton piece „	$\frac{1}{12}$ „		

Note.—The gold and silver coins cannot be said to have any existence. The copper coinage is alone abundant, and for the real metallic currency of Greece, see following extract of tariff:—

Gold coins.	Tariff value in drachmes.		Sterling money.		
Spanish doubloon	Drs. 92	60	£3	5	10
Portuguese moja dobras	50	25	1	15	$8\frac{3}{4}$
English sovereign	28	12	1	0	0
New Turkish sovereign	26	0	0	18	6
Napoleon	22	33	0	15	$10\frac{1}{2}$
Venetian ducat or sequin	13	24	0	9	5
Austrian do.	13	06	0	9	$3\frac{1}{2}$
Dutch do.	13	0	0	9	3
Silver.					
Mexican or Spanish dollar	6	0	0	4	$3\frac{1}{2}$
German and Imperial dollar	5	78	0	4	$1\frac{1}{2}$
Five-franc piece	5	58	0	4	0
New Turkish dollar (current at)	5	20	0	3	8
Russian silver rouble	4	41	0	3	$1\frac{3}{4}$
English shilling	1	28	0	0	11
Franc	1	11	0	0	$9\frac{1}{4}$
Mixed metal.					
Austrian zwanzigers	0	95	0	0	8

Copper.

The use of all foreign copper money is prohibited by law.

No. 46.
Greece.

C. W. Merlin, Esq.

Q. 6. Are coins representing the lowest denomination of money of account in common use?——

A. The one-lepton piece, although in circulation, cannot be said to be exactly in common use.

Q. 7. What is the coin of lowest value in common use?——

A. The two-lepta piece.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. No, they are not.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The phœnix. The phœnix was divided into 100 parts called lepta.

Q. 10. What was its legal value relatively to the present money of account?——

A. The value of the phœnix was ninety-three lepta of the present money of account, or $\frac{93}{100}$ of the drachme.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. The silver phœnix, worth 8*d.*, and the twenty-lepta piece, worth $1\frac{3}{4}d.$, which were destined by the President Capodistrias to replace the old Turkish piastres and paras, but which never existed in any quantity, and the Turkish currency continued to be the real one till the establishment of the Royal Government.

Change of Money.

Q. 12. When did the change take place?——

A. By a Royal Ordinance dated the 8th (20th) February 1833.

Q. 13. What was the cause of the change?——

A. The phœnix did not contain the legal quantity of silver.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. No, the system was the same as the present.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. No, it was the decimal system as established at this day.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money or in account keeping?——

A. No more inconvenience was felt then than at the present day, as neither the phœnix nor the drachme have ever existed in quantities sufficient to meet the requirements of trade and commerce.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. See reply to the preceding question.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. Neither the one nor the other was the case.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a nondecimal division?——

A. No, the former system, as well as the present, was a decimal one.

Q. 20. In what way was the change effected?——

A. By a Royal Ordinance regulating the currency, dated the 8th (20th) February 1833.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. The relative value of the old lepton to the phœnix was the same as that of the new lepta to the drachme, namely $\frac{1}{100}$ part of each.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. *Simultaneously* with the publication of the Royal Ordinance changing the currency the new coinage was issued, which was struck at Munich and Paris.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. By the Royal Ordinance on the currency, published on King Otho's arrival, the phœnix was declared to be no longer a legal tender.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. Yes, the name of the subdivision of the phœnix (lepta) was retained.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. Not exactly, but very nearly so.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements? ——

A. The phœnix, although it was declared to be no longer a legal tender, was received by the new Government at its intrinsic value of 93 new lepta, in payment of customs taxes, &c.

Debts contracted during the Revolution were paid by the Government at the rate of 100 paras ($2\frac{1}{2}$ piastres) to the drachme.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. Immediate.

Compulsory according to law.

By a Royal Decree, dated the 17th (29th) August 1833, prohibiting the use with the addition Turkish money, under the penalty of confiscation of such of coin, of a fine of 100 to 500 drachmes.

Notwithstanding which accounts were for several years after often kept in piastres and paras.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. See reply to preceding query.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?

A. The inconvenience principally felt is, that while accounts are now universally kept in drachmes and lepta, the copper coinage (lepta) only exists, and almost every denomination of foreign gold and silver coins passes current at a fixed tariff.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. All accounts in Greece are now kept according to the new system.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?

A. In accounts, although not in coins, the change has been effectual, with the exception of some of the border villages of Northern Greece.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?

A. The change was decidedly popular.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.
2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. The new money, *if it really existed*, would be extremely convenient in every way.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. A new decimal system of weights and measures was decreed by a Royal Ordinance, dated the 28th September (10th October 1836,) but this has never been carried out, and all commodities are bought and sold by the old Turkish measure and weight.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. The simplicity of the Turkish system prevents any great inconvenience arising.

Q. 36. How is a decimal division of money reconciled with a nondecimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?

A. Nearly every article in Greeee is sold by weight. Even spirits, wine, and oil are sold by the oke, which is equal to forty-five ounces avoirdupois. The oke being divided into 400 drachmes all retail transactions are extremely easy.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

A. I have nothing to add which is not contained in my answers to the preceding inquiries.

British Vice-Consulate, Athens, 24th March 1856.

C. W. Merlin,
Vice-Consul.

No. 47.
United States.

J. R. Snowden, Esq.

No. 47.

UNITED STATES OF AMERICA.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* UNITED STATES OF AMERICA.

By JAMES ROSS SNOWDEN, Esq., Director of the Mint of the United States.

Department of State, Washington,
24th April 1856.

SIR,

I HAVE the honour to acknowledge the receipt of your note of the 21st ultimo, asking for certain information for the use of the Commissioners appointed by Her Britannic Majesty to inquire into and report upon the question of Decimal Coinage, as applicable to the United Kingdom.

Having referred your communication to the Secretary of the Treasury, I now have the honour to transmit to you a copy of that officer's reply, with the answers given by the Director of the Mint to the queries, a list of which accompanied your note.

I avail, &c.

John F. Crampton, Esq.,
&c. &c. &c.

(Signed) W. L. MARCY.

SIR,

Treasury Department, 24th April 1856.

I HAD the honour to receive your letter of the 25th ultimo, together with a letter from Mr. Crampton, the British Minister, enclosing a number of interrogatories prepared by his Government, the object of which is to obtain information upon the subject of a Decimal Currency, as applicable to Great Britain, and now beg leave to transmit replies which have been prepared by the Director of the Mint, and which I trust will be found sufficiently full and explicit.

I am, &c.

The Hon. W. L. Marcy,
&c. &c. &c.

(Signed) JAMES GUTHRIE,
Secretary of the Treasury.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. The money of account of the United States was established as the dollar, first, by resolution of Congress under the Confederation, dated July 6, 1785, and subsequently, under the present constitution, by the Act of April 2, 1792, organizing the Mint. In the language of the latter Act, "the money of account of the United States shall be expressed in dollars or units, dimes or tenths, cents or hundredths, and mills or thousandths."

The dollar or unit has its legal representative in a gold coin of $25\frac{8}{10}$ grains, nine tenths fine, and in a silver coin of $412\frac{1}{2}$ grains, nine tenths fine, either of which are legal tenders of payment.* But the dollar of silver being undervalued by law, in comparison with gold, no longer circulates, and is sold as bullion at a premium of about five per cent. It is rarely coined, and only for the use of manufacturers of plate, or of merchants in foreign trade. Practically, the only legal tender is the dollar of gold, and its multiples of the higher denominations. The silver coinage inferior to the dollar was by the Act of February 21, 1853, reduced in weight, and purposely overvalued in relation to gold, being made legal tender only to the amount of five dollars.† Our system in relation to the silver coinage is, in fact, substantially the same as that of Great Britain.

Q. 2. What are the subdivisions of such money of account?——

A. In silver, the half dollar or fifty cent piece (weighing 192 grains, nine tenths fine), the quarter dollar or twenty-five cent piece, the dime or ten cent piece, the half dime or five cent piece, and the three cent piece, all of weight proportional to the half dollar. In copper, the cent (of 168 grains), and the half cent.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. In general terms it may be stated that we have but two denominations of money of account, the dollar and cent. Below the cent we do not usually reckon in mills or decimals, but in binary fractions of a cent. Sugar and cotton, for example, will have their prices named, not in cents

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* This gives the value of gold to silver as 15·988 : 1, at which value one ounce of English standard silver is worth 58·98*d.*

† In this coinage the value of gold to silver is as 14·883 : 1, at which value one ounce of English standard silver is worth 63·357*d.*

and mills, but in cents and halves, fourths, eighths, or sixteenths per pound. Above the cent we count generally by multiples of a cent up to the dollar. Thus, we should not say one dollar eight dimes seven cents five mills, but one dollar eighty-seven and a half cents. In legal enactments, however, the fractions of a cent are usually expressed in mills or decimally.

The custom still obtains in many, if not most of the older States of the Union, of expressing small prices *colloquially* in shillings and pence. This custom is continued, apparently, only in consequence of the retention in our circulation of the small fractions (fourths, eighths, and sixteenths) of the Spanish dollar. These pieces had, before the establishment of our present currency, been very generally introduced into the country, and were circulated at a customary valuation expressed in shillings or pence of the colonial currency. The eighth of a dollar or real was named in New York and North Carolina as a shilling, in South Carolina and Georgia as sevenpence, in New Jersey, Pennsylvania, Delaware, and Maryland as elevenpence, in the New England States and Virginia as ninepence. With the retention of the coins, which has been partly due, perhaps, to their expressing binary divisions of the dollar, to which the popular mind appears to attach itself, the old names are still retained. It should be observed, however, that these names have no association with any pound of account of which they are constituents, but only with the dollar, to which alone they have relation; the words shilling, elevenpence (or levy), ninepence, sevenpence, as used in different States, being now but cant terms expressing an eighth part of the unit or dollar. In book-keeping and accounts prices indicated in this way are always carried out in cents and fractions, that is, as $12\frac{1}{2}$ or $6\frac{1}{4}$ cents for the eighths and sixteenths respectively.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. Assuming gold as the basis of comparison, and the sovereign and dollar to be conformed to their respective legal standards of weight and fineness, the dollar is equal to 49·316 pence, or (not carrying the fraction to a great nicety) to 49·3; and hence the cent is equal to 0·493 pence, or very nearly a halfpenny, the mill to 0·049 pence.*

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. The following table is presented as an answer to this query:—

Species of Coin.	Names of the Coins.	Value in Dollars.	Value in Pence.
Gold coins	Double eagle	$ 20·00	986·4
	Eagle	10·00	493·2
	Half eagle	5·00	246·6
	Three dollar	3·00	147·9
	Quarter eagle	2·50	123·3
	Dollar	1·00	49·3
Silver Coins	Dollar	Passes at premium, see answer to Query 1.	
	Half dollar	0·50	24·7
	Quarter dollar	0·25	12·3
	Dime	0·10	4·9
	Half dime	0·05	2·5
	Three cent	0·03	1·5
Copper Coins	Cent	0·01	0·5
	Half cent	0·00½	0·2½

Among the coins generally current in the older States are the fourths, eighths, and sixteenths of the Spanish and Spanish American dollar, which pass at 25, $12\frac{1}{2}$ and $6\frac{1}{4}$ cents respectively. If of full weight, these are a legal currency at these rates, but as they are greatly worn this is never the case, and they consequently retain their circulation by custom only.

Q. 6. Are coins representing the lowest denominations of money of account in common use?——

A. We have no coin representing the mill, the lowest money of account designated by law.

* This gives 1*l.* sterling = £4·86656.—A. S.

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Q. 7. What is the coin of lowest value in common use?——

A. The cent. A few half cents are occasionally coined, but they have no currency.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value, by any and which classes in society?——

A. In the Southern States copper coins are not much used, as being inconveniently low, the half dime being the smallest piece generally current. In the Northern, Middle and Western States, the cent is in general use, and is not found inconveniently low, but the half cent is not current.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The principal money of account before the introduction of the present system was pounds, divided into shillings and pence. Originally the value of the pound was the same as in England, but a diversity afterwards arose in the colonies, in consequence of the greater or less issue of paper money by the colonial authorities. The Spanish American dollar, being familiar to the people, might be considered as a concurrent money of account, for which reason, and in consequence of the diversity of meaning of the word pound in the different colonies, the acts and proceedings of the Continental Congress, assembled at the Revolution, when referring to money, adopt the term dollars, in which unit also the paper currency issued by Congress was expressed.

Q. 10. What was its legal value relatively to the present money of account?——

A. So far as the dollar may have established itself as a unit, its legal value was substantially the same with the present dollar unit. The colonial pounds had the following values, as compared with the pound sterling and dollar:—

Unit of Comparison.	New England and Virginia.	New York and North Carolina.	Middle States.	South Carolina and Georgia.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pound Sterling - - -	1 6 8	1 15 $6\frac{2}{3}$	1 13 4	1 0 $8\frac{8}{9}$
Dollar - - - -	0 6 0	0 8 0	0 7 6	0 4 8

Q. 11. What coins were current, and of what value, in the former money of account?——

A. Under the former system we had no coins of our own, if we except a series of silver, from the shilling downward, coined in Boston from 1652 to about 1700, and another class issued in Maryland, to much less amount, about the same period; and also a variety of copper coins, issued by the various States, after the treaty of peace (1783), and before the adoption of the federal constitution in 1789. Our circulation, apart from our paper currency, was, therefore, a heterogeneous mixture from abroad, such as the gold and silvercoins then current in Great Britain, Spain, Spanish America, Portugal, and France; taken and received without much exactness, at rates based on the colonial pounds, shillings, and pence. But the dollar and its parts,—the half, fourth, eighth, and sixteenth, and the fifth (or pistareen), tenth, and twentieth, were the prevalent coins.

Q. 12. When did the change take place?——

A. See answer to Query 1.

Q. 13. What was the cause of the change?——

A. The necessity and the constitutional duty imposed on Congress of establishing a uniform currency for the United States.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. It was. The previous answers will have shewn the complexity in the state of the currency anterior to the change.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units, or in their proportions to each other?——

A. There was great inconvenience, confusion, and complexity in the previous currency, not only because of the different value put upon pounds, shillings, and pence in the several states, but because any system which has an irregular ratio of multiplication or division must be complex and tedious, whilst one which is founded on the common way of writing numbers, which is by tens, must be easy and simple and less liable to error. As an

instance of the complexity of the former custom it may be interesting to state, that in the printed facsimile of General Washington's account book we have the pounds, shillings, and pence of Pennsylvania, the Spanish dollars, and paper dollars, all stated, and reduced to Virginia currency, to which he was most accustomed.

Q. 16. Were the inconveniences (if any) which caused or promoted the change inconveniences felt in paying and receiving money, or in account keeping?——

A. The inconveniences of the former system were great, as well in paying and receiving money as in keeping accounts.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. By all classes.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use, either as a money of account or of exchange before it was established by law?——

A. The change was not recommended, apparently, with a view to assimilate our coinage to that of other countries, but from the necessity of correcting the inconveniences of the existing currency. By reference to the answers under Queries 9, 10, and 11 it will be seen that the people were familiar with the dollar, both as a money of exchange and of account, before the question of a uniform currency had been raised, and the adoption of the dollar as a unit was in consequence of this familiarity alone.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a non-decimal division?——

A. The introduction of new decimal coins, fractions of a dollar, was the result of such an abstract preference.

Q. 20. In what way was the change effected? ——

A. By a law requiring the public accounts, and all proceedings in the courts of the federal Government, to be kept and had in accordance with the decimal system, and by issuing coins from the National Mint, in accordance with that system. Such a law did not operate upon accounts and legal proceedings in the respective State Governments, but most of the older States came to the aid of the general Government in this matter, by legislation similar to that of Congress. This legislation did not, however, follow very promptly on the establishment of the federal money, the delay being from two to ten, and even twenty years, and as a consequence the banishment of the old pound unit was but slowly effected.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. They were not.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?

A. The money of account of the federal Government (as has been stated in the answer to Query 1) had been established as the dollar and its decimal parts, in 1785, under the confederation, and subsequently under the present constitution, in 1792, and the accounts of the federal Government had conformed thereto; but no issues from the Mint began to be made until 1795. The query is therefore answered by stating that no new coins were issued in contemplation of or contemporaneously with the change, but that they were issued after the change. Anterior to such issue the coin which represented the unit of moneys to the public mind was the Spanish American dollar. The new issues were the dollar of silver and its half, fourth, tenth, and twentieth, with the copper cent and half cent, and in gold, the eagle of ten dollars, its half and quarter. Subsequently the dollar, three dollar, and twenty dollar pieces, in gold, have been added, and the three cent piece in silver.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?

A. None of the coins were called in, nor was their circulation prohibited except in the case of copper. By an Act of Congress of 1792, which became operative in 1795, the currency of any other copper coin than the cent and half cent was prohibited under penalty of fine and forfeiture.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. The dollar was a new coin as to devices and proportions, but was designed to contain the same value of pure metal as the Spanish dollar, and was substantially the same coin. The dime and half dime also corresponded to the half and quarter pistareen in current value, but were new names; so likewise the eagle, half eagle, and quarter eagle were new names.

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Q. 25. Were the old moneys of account of the lower denominations commensurable with, and exactly expressible in the new moneys?——

A. By reference to the answer to Query 10 it may be seen that the dollar was equal to 72 pence, local currency, in the New England States and Virginia, to 96 pence in New York and North Carolina, to 90 pence in the Middle States, and to 56 pence in South Carolina and Georgia. It follows consequently that the penny in the States named respectively was equal to $1\frac{7}{18}$ cents, to $1\frac{1}{24}$ cents, to $1\frac{1}{9}$ cents, and to $1\frac{11}{14}$ cents, and was not commensurable with the new money of account in either cases.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c., belonging to private persons, to municipal or other public bodies, or to the state, the right to which was acquired under the old system, or any other fixed engagements?——

A. No provision appears to have been made in the laws either of the general or state governments to regulate the ratio of the old to the new currency, except in New York, where, by an Act passed in 1801, the dollar was rated at six shillings currency. In computations the old valuations of the dollar in pence were kept up. In payments of small sums, which required liquidation in copper, it is not certainly known in what way the incommensurability of pence with cents was adjusted. But it is believed that the copper coins in circulation were substantially regarded as cents; penny and cent were colloquially synonymous, and indeed are generally so at present. The fractional loss of value as between the penny and the cent was borne by the buyer or seller as the case might happen, in the same manner as is now done relative to the half and quarter cent fractions when payments are made in the small denominations of Spanish silver. Tolls, postages, and other fixed dues rated to the penny were doubtless adjusted in this manner. Our postages and duties being established under the federal Government were expressed in dollars and decimals, so that no difficulty could arise. In New York, where the cent was $\frac{96}{100}$ of a penny, the pieces doubtless replaced each other in small payments from the beginning. In the Southern States copper did not circulate, so that no trouble from the incommensurability of the copper coins could have arisen.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. The change was compulsory and immediate, so far as related to the accounts and judicial proceedings of the federal Government, but was not enforced by penalties. In the States the change was introduced in the same way at longer or shorter intervals. See on this point the answer to Query 20. The use of the system in public accounts was effectually enforced; but in private accounts and in popular language the old system has only passed out with the present generation. In an arithmetic published in 1818 by Dr. Patterson, at that time Director of the Mint, it is stated, that "In all the public offices of the United States, and in those of many of the particular States, as well as among merchants generally, accounts are now kept in federal money, dollars, and cents. There are, however, many merchants, as well as mechanics and others, who still keep their accounts as before the Revolution in the old nominal money of pounds, shillings, and pence."

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. The systems were concurrently in use among the people for a generation from the establishment of the new money, and, as before stated in the answer to Query 3, the names shilling and pence are still retained, but exclusively as the names of current coins, binary fractions of a dollar, and not with any reference to a pound unit, which has entirely vanished from the popular remembrance.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank notes, and bills of exchange?——

A. There is at present no concurrent use of two units; when such was the case the inconveniences affected accounts and exchanges by complicating calculations in the conversion of one money into the other. Bank notes have always represented dollars.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. Accounts are now always in dollars and cents. Formerly, during the concurrent use of the two units, accounts were sometimes in dollars, sometimes in pounds, shillings, and pence, and sometimes in both currencies.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country, continue to use the old denominations in speaking or keeping accounts?——

A. The change has been effectual as to the use of dollars and cents, but not of the mill, the fractions of a cent being expressed binarily.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. The change was popular, and approved by all classes of the community; but, notwithstanding, experience showed, as we have seen, that the former habits of the people were very slowly supplanted, although the advantages of the new money were unanimously conceded.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?—

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.

2d. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. The conveniences and advantages of the new money as compared with the old are very great. It is believed there are no advantages required in a monetary system which ours does not possess. The unit is sufficiently large to be represented in a gold coin, which is a favourite with the people, and its hundredth is small enough to represent the least prices at which it is desired or desirable to sell articles by retail. In accounts it indicates the sum of ordinary transactions without the multiplicity of figures which a smaller unit (as the franc) involves; while it is unnecessary to use a notation extending beyond the hundredth, as would be required in case the unit decimalized had been of large value (as the pound sterling). The query proposed may be answered affirmatively in all its particulars.

Weights and Measures.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? Or was it in any and what way connected with it?——

A. We have no decimal weights and measures provided by law. In the business of the Mints it is customary to express the weight of precious metals in ounces and decimals, and the same system is followed to some extent by bullion dealers.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. The inconveniences of the non-decimal division of weights and measures are very great, but they are not aggravated by the concurrent use of decimal money.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. The concurrent use of non-decimal division of commodities with a decimal coinage tends, in reckoning prices, to a result expressed in a binary fraction of a cent. In such cases, if payment be made, three fourths of a cent is liquidated with a cent; a half cent is sometimes paid the same way, sometimes not noticed. The quarter cent is not liquidated. In accounts the three quarters, halves, and fourths of a cent are generally entered, and added in on footing the columns, the total being carried to the cents, a fraction above half a cent being counted as a cent. It is believed that no sensible loss to either party arises in the long run from this practice. Even in a complete decimal system of weights, measures, and coins it would be impossible to liquidate accurately all reckonings, unless the least coin were smaller than the public would endure.

General Query.

Q. 37. Add any other statement or information which you may consider to be of use?——

A. The scope of this inquiry may admit of the suggestion, that if the decimalization of the British coinage were effected by adopting, in place of the pound sterling a new unit of the value of one hundred of the present divisions of the pound (say 100 farthings, halfpence, or pence) all prices and coins under the present system would be exactly measured in the new unit and its parts, which would also be almost exactly commensurable with the dollar of the United States. A unit of 100 halfpence, for example, which might be called a dollar, would be equal to $1·013 of the United States, an approximation to our unit so close that the moneys of the two countries, under such a system, might be deemed substantially identical.

The suggestion may also be thrown out that the system of British moneys would be greatly improved if the occasion of its decimalization

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were availed of to make a change from a binary to a decimal notation in the fineness of their coins. In such a case the fineness adopted for the coins of the United States and France, namely 900 fine, would seem to present superior advantages.

The following documents, bearing upon the system of the United States in money, weights, and measures, may be referred to:—

1. Notes on the Money Unit of the United States, by Mr. Jefferson; presented to the Congress of the Confederation in 1782. See his works as published by Congress in 1853, vol. 1, pages 53 and 162. The Report of the Financier, which called out these notes of Mr. Jefferson's, if ever printed, has not fallen under notice.

2. Report of Alexander Hamilton, Secretary of the Treasury, addressed to Congress in 1792 on the Establishment of a Mint.

3. Report to Congress in 1790 by Mr. Jefferson, Secretary of State, on a uniform System of Weights, Measures, and Coins.

4. Report of a Committee of the House of Representatives on Weights and Measures in 1819.

5. Report of John Quincy Adams, Secretary of State, on Weights and Measures in 1821.

JAMES ROSS SNOWDEN, Director.

Mint of the United States, Philadelphia,
12th April 1856.

No. 48. United States.

Ed. Everett, Esq.

No. 48.

ANSWERS to QUERIES proposed by Her Majesty's Commissioners for inquiring into Decimal Coinage, *so far as regards the* UNITED STATES OF AMERICA.

By EDWARD EVERETT, Esq.

Present Money of Account.

Q. 1. What is the money of account at present established by law?——

A. The Spanish dollar.

Q. 2. What are the subdivisions of such money of account?——

A. Nominally dimes $\frac{1}{10}$, cents $\frac{1}{100}$, and mills $\frac{1}{1000}$; but practically dollars and cents only.

Q. 3. Are more than two denominations of money of account practically used in expressing or recording payments and receipts, and what are those denominations?——

A. Only two; dollars and cents.

Q. 4. What is the value of the highest and of the lowest unit of such money of account estimated in money of the United Kingdom?——

A. The pound sterling was declared by Act of Congress in 1842 to be equal in account to 4 dollars $\frac{84}{100}$.

Present Current Coins.

Q. 5. What are the coins current by law, and in general circulation, and what is their respective value in the money of account, as well as in coins, of the United Kingdom, distinguishing gold, silver, copper, or mixed metal?——

A. The most common coins in circulation are eagles, half-eagles, and quarter-eagles of gold; the eagle being ten dollars. We have also gold dollars, pretty common of late, and double eagles of 20 dollars. A large gold piece of 50 dollars has been struck in California; but I have never seen it. The silver coins are dollars (not often seen of the United States coinage), half-dollars, quarters, eighths (Spanish), dimes, sixteenths (Spanish), half-dimes; and a 3-cent piece of base metal struck for the convenience of paying postage, a simple rate being 3 cents.

Q. 6. Are coins respecting the lowest denomination of money of account in common use?——

A. The lowest coins in use are copper cents and half-cents, $\frac{1}{100}$ and $\frac{1}{200}$ of a dollar. The former are common, the latter rare.

Q. 7. What is the coin of lowest value in common use?——

A. The copper cent.

Q. 8. Are the lowest coins in common use complained of as inconveniently low or inconveniently high in value by any and which classes in society?——

A. I never heard either complaint.

Former Money of Account and Coins.

Q. 9. What was the money of account before the introduction of the present system? What were its subdivisions?——

A. The money of account in the United States, while they were British Colonies was, I suppose, the pound sterling; but the "pound lawful," which was 25 per cent. less than sterling, was also much used in account.

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Q. 10. What was its legal value relatively to the present money of account?——

A. I believe the legal value of the pound sterling expressed in dollars before the revolution was $4\frac{44}{100}$; in other words, the Spanish dollar was reckoned at 4*s.* 6*d.* sterling.

Q. 11. What coins were current, and of what value, in the former money of account?——

A. The Spanish dollar and all its parts chiefly; but all the common European coins were known here, both gold and silver, the former generally passing by weight.

As early as 1652, silver shillings, sixpences, and threepences were coined in Boston, and continued to be till 1686. This was under the authority of the colony of Massachusetts Bay.

Change of Money.

Q. 12. When did the change take place?——

A. The Continental Congress early in the revolutionary war issued paper money, of which the dollar was the unit. In 1785 the same Congress formally adopted the dollar as the unit. No coinage of silver took place till 1794, nor of gold till 1795; both after the adoption of the present Government in 1789.

Q. 13. What was the cause of the change?——

A. The inconvenience of the different valuations of the pound sterling as expressed in the pound lawful in different States; the great advantage of a uniform system; the uncertain valuation of foreign coins, which filled the channels of circulation; and the superior simplicity of the decimal notation.

Q. 14. Was it caused by any inconveniences, confusion, or complexity in the state of the previous currency?——

A. See the preceding answer.

Q. 15. Were there in the previous currency any inherent inconveniences in the value of the principal or subordinate units or in their proportions to each other?——

A. All the inherent inconveniences of the pound sterling, and its subdivisions, with the additional complication of the various colonial currencies. Thus a Spanish dollar was 6*s.* in one colony, 4*s.* 6*d.* in another, 5*s.* in a third. After the establishment of the independence of the United States it was almost a matter of course to establish a national currency.

Q. 16. Were the inconveniences (if any), which caused or promoted the change, inconveniences felt in paying and receiving money, or in account keeping?——

A. Both; but the last-named inconvenience would be most felt in keeping accounts between parties living in different States.

Q. 17. If such inconveniences existed, by what classes of society were they chiefly felt?——

A. The first-named inconvenience would be most felt in small purchases, the last by tradesmen whose business was somewhat extended.

Q. 18. Was the change caused to any and what extent by a desire to assimilate the currency to that of neighbouring countries; and if so, had the new money been rendered familiar by its use either as a money of account or of exchange before it was established by law?——

A. I do not think the change was made from any wish to assimilate our currency to that of the country whose currency we adopted (Spain and her American colonies), but we took their dollar because we were familiar with it ourselves, and knew it to be well understood throughout the commercial world.

Q. 19. Or was the change caused to any and what extent by an abstract preference for a decimal division of money over a nondecimal division?——

A. The dollar was not adopted from any preference of the decimal system; because that system did not coexist with the dollar in the countries from which we borrowed it. But the decimal system was adopted at the same time with the dollar from considerations of convenience, simplicity, and numerical beauty.

Q. 20. In what way was the change effected?

A. By a resolve of the Continental Congress (before the adoption of the Federal Constitution in 1789), having the force of law.

Q. 21. Were the relative values of any of the coins previously in circulation changed?——

A. No.

Q. 22. Were any and what new coins issued before and in contemplation of, simultaneously with, or after the change?——

A. After the establishment of the Mint of the United States (in 1792), we began to coin eagles and half-eagles in gold, and dollars, half-dollars

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quarter-dollars, and dimes in silver. The gold coins were *new* coins. The silver coins (except dimes) corresponded with Spanish coins of the same value, but had new devices; half-dimes were coined later. Copper cents had been coined by some of the States before the revolution, but there is now no *state* coinage.

Q. 23. Were any and which of the previous coins withdrawn from circulation, and were any and which of the old coins permitted to circulate simultaneously with the new?——

A. None withdrawn or forbidden to circulate; but nothing is a legal tender except the gold and silver coins of the United States.

In point of fact no foreign gold circulates, but the Spanish (Mexican) silver coins circulate freely.

Q. 24. Were any old names given to new coins, or new names to old coins?——

A. No.

Q. 25. Were the old monies of account of the lower denominations commensurable with and expressible exactly in the new monies?——

A. They were not.

Q. 26. If not exactly expressible, what provision was made for debts contracted under the old system, and to be discharged under the new? Or, in the case of fixed money tolls, pontages, duties, &c. belonging to private persons, to municipal or other public bodies, or to the State, the right to which was acquired under the old system, or any other fixed engagements?——

A. It was provided by law that the pound sterling should be $4\frac{4}{100}$ dollars; of course all the subdivisions of the pound sterling could be expressed by close approximation in the dollar and its decimal parts. In local laws fixing tolls, a revision took place in order to their expression in the new currency.

Q. 27. Was the change in the money of account gradual or immediate? Was it optional or compulsory? If compulsory, how and by what penalties was it enforced? Was it effectually enforced? or did the old system continue in use for any and what time in accounts or in popular language?——

A. The public accounts of the United States were, I think, kept in dollars from the commencement of the revolution, and before the formal enactment of the change. It was of course compulsory on the public officers, but on no others. It was gradually adopted by the people, but one still occasionally hears the old denominations because we retain the coins ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ of a dollar) to which they belong. A shopkeeper will more readily say two shillings and threepence than $37\frac{1}{2}$ cents.

Q. 28. If the change was optional, did the old and new systems continue in use concurrently for any time, and do they still continue in use concurrently?——

A. The old and new system still remain in concurrent popular use, but all accounts, public and private, are, and for two generations have been, kept in dollars and cents.

Q. 29. Have any and what inconveniences been found to arise from such concurrent use? How does such concurrent use affect accounts, bank-notes, and bills of exchange?——

A. There is some trifling inconvenience in this concurrent popular use, but it is very trifling, because the $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, and $\frac{1}{16}$ parts of a dollar are instantaneously converted into cents in the mind of buyer and seller; it is perfectly indifferent whether you call a quarter of a dollar by that name or 25 cents. In accounts, bank-notes, and domestic bills of exchange dollars and cents alone are used.

Q. 30. Under such concurrent use, how do merchants and bankers keep their accounts?——

A. There is no concurrent use in the accounts of merchants. They use nothing but dollars and cents, except in their dealings with Europe.

Q. 31. Has the change been effectually made, or do any and what classes of persons in any and what parts of the country continue to use the old denominations in speaking or keeping accounts?——

A. In accounts the change has been effectually made; but see 29th answer.

Q. 32. Was the change at the time of its introduction unpopular with any and what classes of society? If any such unpopularity existed, has it been transitory or lasting? Does it now exist? Did the change cause any popular commotions or uneasiness?——

A. I think everybody was prepared for the change by the previous customary use of the dollar, and the simplicity and beauty of the decimal system were immediately felt by all; but the change not being compulsory could have aggrieved no one.

Q. 33. Is the new money more or less convenient than the old, and what are its advantages or disadvantages?

1st. In paying and receiving—(*a*) Large sums. (*b*) Small sums.

2nd. In keeping accounts—(*a*) In large transactions. (*b*) In small transactions.

A. The decimal system is in all respects the most convenient and simple; and its convenience would be still more obvious but for the retention of the ancient $\frac{1}{4}$, $\frac{1}{8}$, and $\frac{1}{16}$ of a dollar. These are retained from the difficulty of abandoning a habit, though a bad one.

Weights and Measures.

No. 48.
United States.
Ed. Everett, Esq.

Q. 34. Are weights and measures divided decimally? If so, did such decimal division precede, accompany, or follow the decimal division of money? or was it in any and what way connected with it?——

A. They are not.

Q. 35. If not, are any inconveniences found to arise from the division of weights and measures not corresponding with the divisions of money?——

A. There would no doubt be a great convenience in extending the decimal system to weights and measures, but I am not aware of any inconvenience like that alluded to in the query.

Q. 36. How is a decimal division of money reconciled with a non-decimal division of commodities in the retail transactions of the poorer classes? Does inconvenience or loss arise to them therefrom?——

A. There is no inconvenience in applying the decimal notation to the non-decimal division of commodities, though an overcharge takes place in small transactions. Thus a pound of nice breakfast tea in Boston costs fifty cents (half a dollar); a person who wished to buy an ounce would certainly not be charged 3 cents, 1 mill, and quarter of a mill, but 5 or 6 cents. But this always happens in retail trade; it is not a matter of currency, but it is to pay the seller for the trouble and waste of breaking his package and selling in driblets.

General Query.

Q. 37. Add any other statement or information which you may consider to be useful in the present inquiry, and forward with your replies to these questions copies of any laws, ordinances, reports, or public documents bearing on the subject, by describing the change of coinage, the reasons for its adoption, and the mode in which it has been carried into effect.

EDWARD EVERETT.

No. 49.

No. 49.
United States.
Report, &c.

EXTRACT from a REPORT of the DIRECTOR OF THE MINT of the UNITED STATES to the SECRETARY OF THE TREASURY.

Mint of the United States,
Philadelphia, December 13, 1854.

SIR,—In compliance with the request contained in your letter of the 11th instant, I have caused to be struck, and herewith forward, one hundred specimens of the proposed cent therein referred to, and have the honour now to recapitulate the various points of information on that subject which have hitherto been communicated to the department. In so doing, it will, perhaps, best subserve the wishes of the department, and of the committees in Congress, if I should present the projét of a law in several sections, with explanatory remarks appended to each section.

AN ACT RELATING TO THE COINAGE OF CENTS.

Sec. 1. Be it enacted, &c., That from and after the passage of this Act, the standard weight of the cent coined at the mint of the United States shall be ninety-six grains, or two tenths of one ounce troy, with no greater deviation than four grains in a single piece; and that the coinage of the half cent shall cease.

Remarks.—The present weight of the cent is 168 grains; at the current price of copper, the government is barely saved from loss by the coinage, and is every day liable to become an actual loser. Yet the experience of every country has settled this point, that the lowest denominations of coin are not made acceptable on account of their market value, but on account of the government stamp, and the convenience of having such pieces for small transactions. For the proposed reduction of the weight of the cent we have abundant precedents. In 1792 the legal weight was 264 grains; early in 1793 it was reduced to 208 grains; in 1796, in pursuance of legal authorization, President Washington issued a proclamation reducing the cent to 168 grains—the present legal standard. In France at this day the piece of ten centimes—say two cents of our money—weighs less than our cent, yet it passes freely. Dealers all over the country will feel obliged for such an unloading of copper as the change from 168 to 96 grains would produce. The allowance of four grains for deviation is a customary "remedy of the mint," and is necessary for practical operations. The omission of the half cent scarcely needs a remark. It is useless. People will not take the trouble to make a cent with two pieces of money.

Sec. 2. Be it further enacted, That the said cent shall be composed of copper, with any admixture, not exceeding five per cent. in weight, of metals which may render it more suitable for the purposes of coin. And the devices upon said cent shall express its country, denomination, and date of coinage.

Remarks.—In regard to the various experiments recently made here, as to the desire-

ableness of introducing a German silver cent, I presume it will not be necessary here to recapitulate the correspondence which is already in the possession of the department, and which I presume will be laid before the committee in Congress to whom it is your desire to refer this subject. A decided preference for the copper coin, if its weight can be reduced to 96 grains, is the conclusion to which my mind is brought, after a careful consideration of the advantages and objections on both sides. The allowance of five per cent. for the admixture of other metals—tin and zinc being intended—is to make an alloy which will improve the colour and reduce the liability to corrosion and foulness. It is the same mixture which the French are using for coinage under the name of bronze, but I have avoided that term as being vaguely applied among us to very different metallic mixtures and colourings.

Sec. 3. Be it further enacted, That it shall be at the discretion of the Director of the mint, with the concurrence of the Secretary of the Treasury, to cause the planchets for the cent coinage to be prepared at a private manufactory, as hitherto prescribed by law, or more directly under the supervision of the Director, or such officer of the Mint as he may designate. And the profits arising from the sale and distribution of said coinage, after deducting expenses of transportation as provided for in the 36th section of the Act of Jan. 18, 1837, relative to the Mint, shall be paid, from time to time, into the treasury of the United States.

Remarks.—It seems quite obvious that the mint ought not to be compelled, as it now is by law, to procure its copper planchets for coinage from a private or remote manufactory, and especially if the planchets are to be alloyed to a definite per-centage. This section will only confer the choice upon the Director, with the approbation of the Secretary of the Treasury, of having this business done under his own direction. It is not intended to find any fault with the present manufacture of planchets, which, in fact, is quite satisfactory.

Sec. 4. Be it further enacted, That it shall be at the discretion of the Director of the Mint, with the concurrence of the Secretary of the Treasury, at any period not earlier than one year after the passage of this Act, and upon due public notice, to exchange the cents provided for by this Act for those now current, upon such terms as may ensure a sufficient supply of copper from that source, and with a view to the gradual withdrawal of the old coins from circulation. But no other copper coins or tokens shall be so received.

Remarks.—The impolicy and incongruity of having two cents of quite different weights current at the same time, suggests the propriety of conferring this discretionary power. The coinage of cents and half cents, up to May last, amounted in round numbers to $1,520,000—equa to, say 1,620 tons—the larger part of which are probably now in circulation; and it is well known that some parts of the country are crowded with them. On this subject we have frequent complaints, without the power of providing a remedy. The proposed cent of 96 grains, assuming the planchets to cost 41¾ cents a pound avoirdupois, would afford a profit of 43 per cent. The new bronze coinage of France, assuming the same cost of planchets, yields a profit of 54 per cent. We are therefore within the line of safe precedent, considering that the French coin passes freely. But in addition to this it should be noted that much of the importance of the new cent project consists in relieving the country from the present ponderous cent; and if it will require, as is probable, 50 cents a pound to get in the old cents, and a considerable per-centage for working them up into new planchets, the profit, as above stated, will be considerably diminished; so much so as to obviate objection on that score. It is quite important to keep in view the two objects of the law, namely, the issue of a light and convenient coin, and the withdrawal of a cumbrous one; and to accomplish both objects a considerable apparent profit will be necessary. In the matter of making the exchange the Mint should have a sort of ubiquity, by paying the expenses of transportation both ways; so that our fellow citizens at Milwaukie or Tallahassee would be placed on the same footing as those in Philadelphia.

I may say, in regard to the danger of counterfeiting, that it would seem impossible to push into circulation to any profitable extent a coinage of so low a denomination. The numerous copper tokens of 1837 were openly issued in the exigency of the times; but the issue of a public notice that the law would be enforced against them, immediately put a stop to their circulation.

Sec. 5. And be it further enacted, That the coin provided for in this Act shall be a legal tender in payment of debts to the extent of ten cents in any one payment.

Remarks.—The object of this section is to give a legal importance and value to the new cent, in addition to the authoritative stamp of the Mint. The present cent is not a legal tender.

In conclusion I may remark that whilst I at present prefer the proportions of 95 per cent. copper, and 5 per cent. of zinc and tin, as composed in the specimens presented, yet I have purposely avoided naming these metals in the 2d section, in order that we may, if we think proper, use nickel in the composition, as to which point I will cause some experiments to be made for the purpose of ascertaining whether a further improvement is not attainable; but these inquiries need not prevent immediate action upon the proposition herein presented.

I have the honour to be, with great respect, your faithful servant,

JAMES ROSS SNOWDEN, Director.

Hon. James Guthrie, Secretary of the Treasury,
Washington City.

No. 50.

The New Coinage Law in the United States.

January 15, 1857.

The following Act of the United States Legislature has been passed for the regulation of foreign coins in circulation in that country.

An Act relating to Foreign Coins and to the Coinage of Cents at the Mint of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That the piece commonly known as the quarter, eighth, and sixteenth of the Spanish pillar dollar, and of the Mexican dollar, shall be receivable at the Treasury of the United States, and its several offices, and at the several post offices and land offices, at the rates of valuation following,— that is to say, the fourth of a dollar or piece of two reals, at twenty cents; the eighth of a dollar, or piece of one real, at ten cents; and the sixteenth of a dollar or half real at five cents.

Sec. 2. And be it further enacted, That the said coins, when so received, shall not again be paid out or put in circulation, but shall be recoined at the mint. And it shall be the duty of the Director of the Mint, with the approval of the Secretary of the Treasury, to prescribe such regulations as may be necessary and proper to secure their transmission to the mint for recoinage, and the return or distribution of the proceeds thereof, when deemed expedient, and to prescribe such forms of account as may be appropriate and applicable to the circumstances: provided, that the expenses incident to such transmission or distribution and of recoinage shall be charged against the account of silver profit and loss, and the net profits, if any, shall be paid, from time to time, into the Treasury of the United States.

Sec. 3. And be it further enacted, That all former Acts authorizing the currency of foreign gold or silver coins, and declaring the same a legal tender in payment for debt, are hereby repealed; but it shall be the duty of the Director of the Mint to cause assays to be made, from time to time, of such foreign coins as may be known to our commerce, to determine their average weight, fineness, and value, and to embrace in his annual report a statement of the results thereof.

Sec. 4. And be it further enacted, That from and after the passage of this Act the standard weight of the cent coined at the mint shall be seventy-two grains, or three-twentieths of one cent troy, with no greater deviation than four grains in each piece; and said cent shall be composed of eighty-eight per centum of copper and twelve per centum of nickel, of such shape and device as may be fixed by the Director of the Mint, with the approbation of the Secretary of the Treasury; and the coinage of the half-cent shall cease.

Sec. 5. And be it further enacted, That the Treasurer of the Mint, under the instruction of the Director of the Mint and with the approval of the Secretary of the Treasury, shall, from time to time, purchase from the bullion fund of the mint the materials necessary for the coinage of such cent piece, and transfer the same to the proper operative officers of the mint to be manufactured and returned in coin. And the laws in force relating to the mint, and the coinage of the precious metals, and in regard to the sale and distribution of the copper coins, shall, so far as applicable, be extended to the coinage herein provided for: provided, that the net profits of the coinage, ascertained in like manner as is prescribed in the second section of this Act, shall be transferred to the Treasury of the United States.

Sec. 6. And be it further enacted, That it shall be lawful to pay out said cent at the mint in exchange for any of the gold and silver coins of the United States, and also in exchange for the former copper coins issued: and it shall be lawful to transmit parcels of the said cents, from time to time, to the Assistant Treasurers, Depositories, and other officers of the United States, under general regulations proposed by the Director of the Mint, and approved by the Secretary of the Treasury.

Sec. 7. And be it further enacted, That the Secretary of the Treasury, under such rules and regulations as he may from time to time establish, shall have power to authorize and require medals to be struck at the mint for the several States, incorporated companies, and societies that may apply for them, at a reasonable price for the labour and materials, striking two copies in bronze for a cabinet of medals to be kept in the mint; and out of the profits obtain duplicate copies in bronze for said cabinet of all medals which have been struck at the mint. The accounts of the medals shall be rendered quarterly, and the profits paid into the Treasury, and appear in his annual reports.

Sec. 8. And be it further enacted, That hereafter the Director of the Mint shall make his annual report to the Secretary of the Treasury up to the thirtieth of June in each year, so that the same may appear in his annual report to Congress on the finances.

Passed the Senate April 16, 1856.

Passed the House, with amendments, January 15, 1857.

No. 51.
UNITED STATES.

No. 51. United States. Letters, &c.

EXTRACT from Letter from SAMUEL EWARD, Esq., to THOMAS BARING, Esq., M.P.

Boston, 28th April 1856.

Notwithstanding the long time that has elapsed since the decimal currency was adopted, there remains the local usage, in the two great centres of New York (city) and Boston, of two separate forms of old currency; not as a matter of account, but of retail use in shops. In New York this is simply the division of the dollar into eighths, the $\frac{1}{8}$th, or $12\frac{1}{2}$ cents, being called a shilling, and represented by the old Spanish coin; but in Boston the shilling is represented by no coin in existence; it is simply the 20th part of the old pound of $\$3.33\frac{1}{3}$; consequently a shilling is $16\frac{2}{3}$ cents. And in this denomination and its divisions sums not greater than $\$1.50$ are usually named in the shops. The matter is further complicated by the common use of the Spanish $\frac{1}{8}=12\frac{1}{2}$ cents, and $\frac{1}{16}=6\frac{1}{4}$ cents, called respectively 9*d.* correctly and 4*d* incorrectly, whilst 6*d.* is called $8\frac{1}{3}$ cents correctly. This singular confusion, however, creates no real trouble, because the simple decimal currency can always be referred to in case of difficulty.

EXTRACT from a Letter from R. B. MINTURN, Esq., to Lord MONTEAGLE.

New York, 16th June 1856.

I however sent the Director of the Mint a copy of the inquiries in your letter of the 20th March, and he has sent me two letters in reply, of which copies are enclosed. I am sure of his readiness to render any assistance in this matter that may be in his power; and if there should be any other point upon which you desire information which you suppose he can furnish, I beg that you will inform me, when I will at once endeavour to obtain it and forward it to you.

Mint of the United States,
Philadelphia, 24 May 1856.

DEAR SIR,

As I was leaving the Mint yesterday, at the close of the business of the day, Mr. Hutchinson placed in my hands your favour of the 14th instant, enclosing a copy of a letter from Lord Monteagle to yourself. A copy of the interrogatories to which his lordship refers was forwarded to me from Washington, to which I have very fully replied. As these answers will be communicated to the Royal Commission on a Decimal Coinage, of which Lord M. is chairman, it is unnecessary to repeat them here.

The objections which he states as having been made to the decimal system of money are, I am quite convinced, of no practical moment. As long as we have the decimal system of reckoning numbers by tens, there is every reason, both in theory and practice, why we should also have combined therewith a decimal system of money, weights, and measures.

The partial use in our country of non-decimal coins results from the retention in our currency of the old Spanish coins—fractions of a dollar, to which the prices of minor articles are attached. I have reason to believe that we will be relieved from this inconvenience, inasmuch as a bill has passed the U. S. Senate, and is now pending in the House of Representatives, providing for the withdrawal of this irregular and inconvenient currency from circulation. It must be, I believe, generally conceded, that to express all prices decimally, and to exclude all non-decimal monies, would be of great public advantage.

In answer to one of the points suggested by Lord Monteagle I may add, that although the Spanish non-decimal monies have been permitted to circulate, yet the United States have never issued any other than decimal money. I include among the decimal coins the 3 cent, 5 cent, 25 cent, and 50 cent pieces, which, though not decimal divisions of a dollar, are simple multiples of the cent.

I will be happy to receive a copy of the blue book when printed, containing the report of the Decimal Coinage Commissioners, with the replies which their interrogatories have evoked.

I recur with pleasure to the agreeable interview I had with you at the Mint, and will be glad to see you at any time you may be in Philadelphia.

I am, &c.

Robert B. Minturn, Esq.
New York.

(Signed) JAMES ROSS SNOWDEN,
Director U. S. Mint.

Mint of the United States,
Philadelphia, 13th June 1856.

DEAR SIR,

I have to acknowledge the receipt of your favour of the 10th inst.

I must claim your indulgence for not answering more fully Lord Monteagle's inquiries, because, as stated in my letter of the 24th ultimo, I had elaborately and fully replied to the printed interrogatories to which he refers.

The point to which you now recall my attention was considered by me in replying to the former communication, inasmuch as I regard *all* "the coin of the United States, issued or in circulation, as referring to the decimal system." But if by decimal system is meant tenth of a unit, or ten times a unit, then we only have four coins referring to the decimal system, viz., the dollar as the unit, the dime or tenth part of the dollar, the cent or tenth part of the dime, and the eagle or ten dollars. But this meaning of the expres-

sion "decimal system" is too rigid and confined, and both mathematically and in common life a decimal system is one in which simple multiples of $\frac{1}{10}$ of a preceding unit follow each other. A decimal system of coinage is one in which these multiples are rarely carried beyond the third decimal figure, and more generally only to the second figure. In this sense every coin issued by the United States refers, or rather belongs to the decimal system, because each can be expressed by a single decimal or multiple. Thus the coins are,—

20	twenty dollars.
10	ten dollars.
5	five dollars.
3	three dollars.
2·50	two dollars and fifty cents.
1·	one dollar.
·50	fifty cents.
·25	twenty-five cents.
·10	ten cents.
·05	five cents.
·03	three cents.
·01	one cent.

While all our coins, therefore, are simple multiples or decimals of the dollar, all of the latter except one—the three cent piece—are simple vulgar fractions of the dollar.

Thus:—

Decimals.		Vulgar Fractions.
1·00	- -	1 unit.
·50	- -	$\frac{1}{2}$ the „
·25	- -	$\frac{1}{4}$ „ „
·10	- -	$\frac{1}{10}$ „ „
·05	- -	$\frac{1}{20}$ „ „
·01	- -	$\frac{1}{100}$ „ „

I beg to add, that I am happy to give any information in my power on the important subject which occupies the attention of the Royal Commission, and I entertain the hope that the answers I have made to the printed interrogatories will be found to contain the information his Lordship seeks in regard to the decimal system of coinage and accounts so happily adopted in the United States. I am, &c.,

(Signed) James Ross Snowden,
Director U. S. Mints.

Robert B. Minturn, Esq., &c. &c., New York.

No. 52.

CANADA.

Extract from Answer to Circular Queries by R. N. Cassels, Esq., Manager of the Bank of British North America, Montreal.

Previous to the passing of the Currency Act of 1841 the metallic currency of the two provinces was in a very unsatisfactory state. In Lower Canada the principal coins in circulation were French crowns and half crowns, and which were a legal tender for 5*s.* 6*d.* and 2*s.* 9*d.*, and, as compared with American dollars and half dollars, the French half-crowns, in consequence of being much worn, were worth about 3 and 4 per cent. more than their intrinsic value. In Western Canada, British silver was a legal tender to any amount at 25*s.* currency for the pound sterling, or 3 per cent more than its real value, and in consequence of its over valuation drove out of circulation every other coin.

It would be a public benefit if the currencies of all the colonies were assimilated. During the last ten years in every one of the North American provinces new Currency Acts have been passed; but this desirable object has been entirely lost sight of. It is believed that the Imperial Government has the power of regulating the currencies of all the colonies of Great Britain. By the exercise of this power only will they be assimilated, as the different Colonial Legislatures are each prejudiced in favour of their own particular views in such matters. Should a general Currency Bill be thought of to take effect in all the North American provinces, the currency of the United States should be introduced. It is convenient; it is well understood by the inhabitants of the colonies; and is in every respect the best which we could have.

The change from the present currencies to that of Britain is not desirable. The sterling currency is one of the most inconvenient in Europe, and is only tolerated because the difficulty of changing it to a more convenient mode of computation is so great, and probably would, among the lower orders of the people, be productive of much dissatisfaction. It is, however, very probable, before many years have elapsed, that a decimal currency will be introduced.

Its advantages are apparent to the intelligent classes of the community, and the attention of the public is now directed to this subject.

With reference to the Public Acts and documents bearing on the subject of these queries, I beg to refer to the Currency Acts of the province repealed by that passed in 1841, and to the correspondence on the subject between the Imperial and Colonial Governments in 1851.

R. N. Cassels,
Manager.

Bank of British North America, Montreal,
30th April 1856.

No. 53.

Abstract of Answers received from Countries where a Decimal System has been adopted.

(I.)—Present and Former Monies and their Values.

Countries.	Monies of Account by Law.	Coins in circulation by Law.	Former Monies of Account.	Comparative Values.	Former Coins.	Date of Change.	Weights and Measures Decimal or No?	Intrinsic Values of Coins. (£1 = 113 1/6 2/3 grains fine gold. = 7·3224 grammes do. Shilling = 80 8/11 grains fine silver. = 5·2310 grammes do.)
France (p. 207–225.)	Franc = 100 centimes.	Gold, 100, 50, 20, 10, 5 frs. Silver, 5, 2, 1 fr. 50, 20 cents. Copper, 10, 5, 2, 1 c.	Livre = 20 sous. Sou = 12 deniers.	81 livres = 80 francs.	Gold, 48·24 livres. Silver, 6·3 livre; 30, 15, 24, 12, 6 sols. Copper, 2, 1 sols. 2, 1 deniers.	11 Dec. 1793. 11 Aug. 1795. 28 Mar. 1803.	Decimal. The metrical system introduced in 1793.	Franc = 4·5 grammes fine silver. = 69·4456 grains do. = ·2903 grammes fine gold. = 4·48036 grains do. = 9·5156*d.* £1 = 25·2215 francs.
Sardinia (p. 225–259.)	Lira di Piemonte (or franc) = 100 centimes.	Gold, 100, 80, 50, 40, 20, 10 frs. Silver, 5, 2, 1, ½, ¼ frs. Mixed, 40, 20 cs. Copper, 5, 3, 1 cs.	Piedmont: 1. *Lira* = 20 sols. sol = 12 deniers. Sardinia: 2. *Lira* = 20 sols. sol = 12 deniers. Liguria: 3. *Lira* = 20 sols. sol = 12 deniers.	1. 100 = 118¾ of present. 2. 100 = 192 3. 100 = 83⅓	Gold, 120, 60, 24, 12, 6 lira. Silver, 6, 3, 1½, ¾, sol. Copper, 7, 6, 2, 6, 1, 5, 2 deniers. Genoa and Sardinia had also their distinct coinage.	Piedmont By the French, 1793; suppressed 1814; re-established, 1816. Genoa, 1826. Sardinia, 1842.	Decimal, 1845.	Same as France.
Belgium (p. 259–276.)	Franc = 100 centimes.	No gold coins. Silver, 5, 2½, 2, 1 frs. 50, 20 cs. Copper, 10, 5, 2, 1 c. French coins current.	1. *Livre* de gros = 20 schillings. schilling = 12 gros. gros = 8 deniers. denier = 3 mittes. 2. *Florin* = 20 sous. sou = 16 deniers. 3. *Florin* de Brabant = 20 sous. sou = 12 deniers. 4. *Livre* tournois = 20 sols. sol = 12 deniers. 5. *Florin* des Pays Bas = 100 cents.	1. = 12·69 frs. 2. = 2·1164 frs. 3. = 0·8571 frs. 4. = 80/81 frs. 5. = 2·1164 frs.	43 coins were recognised as legal tenders by Act of 8 December 1824; among these were the legal coins of the Netherlands.	By Napoleon, 1803. Suppressed in 1816. Re-established in 1832.	Decimal. French metrical system, 1816.	Silver same as France. No gold.
Switzerland (p. 276–297.)	Franc = 100 centimes or rappes.	No gold coins. Silver, 5, 2, 1 frs. 50 cs. Copper, 20, 10, 5, 2, 1 c.	Each of the 22 cantons had its own system, and consequently there existed a great variety. The principal were— 1. *Franc* = 10 batz. batz = 10 rappes. 2. *Florin* = 60 kreutzer. kreutzer = 4 deniers. 3. *Crown* = 25 batz.	f. 1. Franc = 1·43 2. Florin = 2·32 3. Crown = 3·57	Gold, 2, 1, ½ louis-d'or. 8, 6, 5, 4, 3, 2, 1½, 2¼ ducats. Silver, 4, 2, 1, ½ frc. 2, 1, ½, ¼, ⅛ florin. Besides these, French and German coins circulated largely.	1850–2. Geneva, 1840.	Mixed. Measures decimal. Weights and liquid measures *not* decimal. Adopted in 1835. Enforced 1857.	Silver same as France. No gold.
Lombardy (p. 297–300.)	Lira Austriaca = 100 centesimi.	Silver, 6, 3, 1, ½, ¼ lira. Copper 15, 10, 5, 3, 1 c.	(Previous to 1803.) *Lira* Milanese = 20 soldi. soldo = 12 denari. (Adopted in 1803.) *Lira* Italiana = 100 cents.	1. 113 9/22 = 100. 2. 87 = 100	—	1803. 1823.	French metrical system introduced in 1803.	Lira = 3·89783 grammes fine silver. = 60·1526 grains do. = 0·8662 francs. = 0·25497 grammes fine gold. = 3·9348 grains do. = 8·356*d.*

TWO SICILIES (p. 301.)	Ducat =10 carlins. =100 grains. =1000 callis. Virtually ducat =100 grains.	No gold coins. Silver, 12, 6, 4, 3, ½, 1, ½ carlins. Copper, 5, 4, 3, 2½, 2, 1½, 1, ½, ¼th gr.	Present system has always existed. Ducat seldom seen.	—	—	—	Decimal by law; but not in use except in Custom House.	Silver: Ducat=19·119 grammes fine silver. =295·05 grains do. =4·25 francs. No gold.
TUSCANY (p. 302.)	Florin =100 cents.	Gold, 80 florins. Silver, 3, 1, ½, ¼, florins. Copper, 40, 24, 20, 12, 8, 4 denari and old coins.	Scudo = 7 lires. Lira = 20 soldi. Soldo = 12 denari. Accounts are still kept even by Government in lires, soldi, denari.	Florin = 400 denari.	Gold, 40 0 0 13 6 8 6 13 4 3 6 8 0 13 4 0 6 8 Silver, 10, 5, 2, 1, ½ lire.	1826; but has virtually never been carried out.	Not decimal.	Silver: Lira = 3·7786 grammes fine silver. = 58·313 grains do. = 0·84 francs. No gold.
NETHERLANDS (p. 306–315.)	Guilder (florin) =100 cents. =200 ½-cents.	No gold coins. Silver, 2½, 1, ½ fls.; 25, 10, 5 cents. Copper, 1, ½ cents.	Guilder = 20 stivers. Stiver = 16 pennings.	No change in value of unit.	Gold, 16·5 guilds.; Silver, 3·3·0; 3; 1·10; 1·8; 1; 2·12; 6·8; 2·10; 0·12·8; 0·6·0; 0·5·8; 0·2; 0·1; Copper, 2 p. Besides many other provincial coins too numerous to mention.	Accounts, 1821. Coins, 1851.	Decimal, 1821.	Silver: Guilder=9·45 grammes fine silver. =145·83 grains do. =2·10 francs. No gold.
PORTUGAL (p. 315.)	Reis 1000=1 milreis Notation— 1.000 : 000$000 $ representing thousands, (:) millions, (.) thousands of millions.	Decimal by law, but not yet issued. Gold, 10$, 5$, 2$, 1$. Silver, $500, $200, $100, $050. Copper, $020, $010. English sovereign current by law at 4$500.	The present decimal system of accounts has always existed, with a duodecimal system of coins.		Silver, 1$000, $480, $240, $120, $100, $060, $050. Copper, $020, $010, $005. English gold current.	29 July, 1854, but not yet carried out.	At present *not* decimal. French metrical system to be established in 1862.	Milreis=1·6257 grammes fine gold. =25·089 grains do. =53·28*d.* Silver coined as a token at the rate of 66·95*d.* per oz. of English standard silver.
RUSSIA (p. 320–327.)	Ruble =100 copecks.	Gold, 10·30, 5·15, 3·09. Silver, 1·50, 1·75 rubles. 75, 50, 30, 25, 20, 15, 10 copecks. Copper, 10, 5, 3, 2, 1, ½, ¼ c.	Banco rubles = 100 copecks. A decimal system has always existed.	2 banco rubles = 7 rubles.	Coins same as at present; but, to avoid agio, values changed.	1839.	Not decimal.	Ruble=17·99 grammes fine silver. =277·62 grains do. =4 francs. Imperial=10·30 rubles. =12 grammes fine gold. =185·18 grains do. Ruble=38·18*d.*
GREECE (p. 327.)	Drachme =100 lepta.	Gold, 20 dr. Silver, 5, 1, ½, ¼ dr. Copper, 10, 5, 2, 1 lepta. English, Turkish, and French gold circulates at values fixed by law.	Phœnix = 100 lepta.	93 phœnix = 100 drachme	Silver phœnix and 30-lepta piece. Turkish coins current.	18 3.	Decimal by law, 1836, but not in use. Old Turkish system in use.	Drachme=4·0293 grammes fine silver. =62·18 grains do. =0·8954 francs.
UNITED STATES (p. 330–341.)	Dollar = 10 dimes. = 100 cents. =1000 mills. Virtually only dollar = 100 cents.	Gold, 20, 10, 5, 3, 2½, 1 ds. Silver, 50, 25, 10, 5, 3 c. Copper, 1 c., ½c.	1. £ *s. d.* currency varying in value in the different States to the amount of 15*s.* 2. Dollars and reals, the Spanish coinage.	—	A mixture of English, Spanish, French, and Portuguese coins.	1785. Issues of coin 1795. The Continental Congress early in the revolutionary war issued paper money of which the dollar was the unit.	*Not* decimal. Same as in England.	Dollar=23·22 grains fine gold. =49·32*d.* Silver coined as a token at rate of 63·36*d.* per oz. of English standard silver.

(II.)—Causes of Change and its Results.

Countries.	Causes of Change.	Inconveniences, if any, of former System, and by what Classes felt.	Reasons for selecting the New System.	Was the Change compulsory and immediate ?	Has it been effectual ?	Was it unpopular ? if so, with whom ?	Is the present a System more convenient than the former ?
France : 1. Ambassador. 2. M. Chevalier. 3. M. Delessert. 4. Commercial agent. 5. M. St. Hilaire.	1. A wish for unity. It was part of a great system comprising weights and measures. 3. To simplify the system of monies, and perhaps through hatred of existing order of things. 5. The confusion in the provinces, and a desire for uniformity.	1. By all classes. 2, 3, 5. The inconveniences of a non-decimal system, felt by merchants and employées of finance. 4. None.	A marked preference for a decimal system. The adoption of the unit was connected with the metrical system.	For private persons the change was not obligatory. There were no penalties to enforce it till 1837. The introduction of the new coins was very slow. The old system continued in use many years in provinces—less so in Paris.	2. Sou is still used by small shopkeepers. 4. Everybody uses the new system ; sou used instead of 5 cents. 5. In some parts of France, Britanny, and Auvergne, the old system has been preserved.	1. Popular with all, save a few. 3. Yes ; with lower classes at first, but not at present. 2, 4. No. 5. Yes ; with ignorant classes.	1, 2, 4, 5. Far more convenient, especially in keeping accounts. 3. Yes ; except in small transactions, for which a duodecimal system is preferred by many.
Sardinia - - 1. H.M. Minister at Turin. 2. Cattaneo, Intendent of the Mint. 3. M. Despine, Inspector of Weights and Measures, Turin.	The French introduced their system in 1793 ; this was suppressed in 1814, but the habits contracted during the French occupation, and the evident advantages of an uniform monetary system were the causes of its re-establishment.	Great inconvenience was felt in returning to the system which existed before the French occupation.	The French occupation, and the constant intercourse with France, had rendered the new money familiar to the public, and induced the wish to assimilate the currency with that of France.	The change was so far gradual that the public had been accustomed to it from the time of the French occupation. It was made compulsory in 1827, and enforced by fine of 50 francs.	The old system continued in use concurrently with the new many years. At present, with exception of the Noverese and Liguria, the new is generally adopted. At Genoa, lower classes and retail dealers use old denominations, and sometimes merchants' books are kept in double columns.	Unpopular with lower classes at the outset, but they are gradually becoming familiar with the new system. 2. It caused no popular disturbance, and was received generally with ease.	More convenient both in large and small transactions. Sums are more easily divided, multiplied, or added up.
Belgium - - 1. Minister at Brussels. 2. Through T. Baring, Esq. M.P. 3. Through Minister.	1. The French introduced their system during their occupation in 1803. In 1816, at the formation of the Kingdom of Netherlands, the Dutch guilder was adopted for the whole country. At the separation of Belgium in 1830, the adoption of a monetary system was again the subject of consideration.	Before 1803 there were at least four different legal systems of account. The inconveniences were felt by all classes. The number of coins lead to confusion and complexity. Losses fell on working classes. There does not appear to have been any practical inconvenience in the system that was adopted in 1816 to 1830.	The first system was introduced by the French for sake of unity. At the last change in 1832, the French system was chosen, in order to facilitate commercial relations with France, and in order to return to the principle of unity, which characterizes the French system.	The ancient coins were gradually withdrawn from circulation. The change was not obligatory for private transactions. For a long time every one kept his accounts in the moneys he preferred without inconvenience, the different moneys being valued by law.	1, 3. The change has not yet been radical and complete. Small sums connected with country people's daily dealings are reckoned in guilders, stivers, or cents. Cent is used by them to designate 2 centimes 2. People are still obliged to have tables of reduction of various monies past and present.	None of the changes appear to have been unpopular. The country was already accustomed to the new system. There was no commotion.	1. Far more convenient than that anterior to 1800, as well in small as in large accounts. 2. The advantages of a decimal system need scarcely be pointed out. 3. An uniform system has been substituted for a multiplicity of coins.
Switzerland - 1. Federal Council. 2. Messrs. Marcuard & Co., Berne. 3. M. Trümpler, Zurich. 4. Capt. Pictet, Consul, Geneva.	1. The necessity of change, caused by the circulation of French and German coins at excessive values. The quantity of base bullion current. 2. The confusion of the different monetary systems of the cantons. 3. The desire to have one kind of money, that of one of neighbouring States.	1. The lower classes suffered from being compelled to accept these coins at more than their value. 2. Inconvenience in account-keeping of former system, and in paying and receiving.	1. A change being decided on, Switzerland was thought too small a country for a separate system, and had to choose between French and German. Her dealings with France were the largest, and Geneva had already adopted the French system.	Each canton fixed a day for the change, and prohibited the use of the old system. The old system continued to be in use at cattle fairs and markets till recently.	1. Yes ; with the exception of lowest classes in the agricultural districts, where "batz" are still spoken of. The new system is exposed to this danger, that the silver coinage is being replaced by French gold, which is not "en rapport" with the metrical system.	1. There was, at first, an aversion on part of those cantons bordering on Germany to use the French system, but it has gone off, and people are well satisfied. 2. Popular because it was well understood.	1. The uniformity throughout the cantons has rendered transactions far more easy, as is also the case with France. 2. The numerous subdivisions of the unit facilitate small transactions.

LOMBARDY - - Through H.M. Minister at Vienna.	In 1803 the French introduced the lira Italiana, equal to the French franc, and decimally divided. In 1823 the Austrians made the last change for the purpose of harmonizing the system with the Austrian, and at the same time to retain the decimal division.	The circulation of different systems, which was felt by commercial classes.	The Austrian lira was chosen, being equal to one third of a florin, the coin current in Austria.	It was left to the arrangements of individuals to employ in payments money not in legal circulation, or to make any special agreements as to value of coins comprised in the tariff.	In small retail transactions the lira Milanese at 20 soldi (12 den. to soldo) are still used.	The new system was received on the whole willingly. It met with no resistance, and its introduction did not require to be enforced by compulsory measures.	It is more convenient, inasmuch as the new money, regard being had to the component parts of the province, corresponds in every respect to rest of monarchy.
TUSCANY - - Through H.M. Minister at Florence.	To do away with the imaginary unit, the "scudo." To adopt a decimal system.	Complexity in accounts.	The florin, being equal to 400 denari, was chosen.	A penalty was ordered for the non-observance of the law.	Averseness to change, and apathy, both of the people and the Government, have allowed the law to be simply a dead letter. The only result has been that the "scudo" is disused; accounts are kept in lire, soldi, and denari. The florins are in circulation without inconvenience.		
NETHERLANDS - 1. Sir J. H. Turing, Bart., Consul at Rotterdam. 2. J. Annesley, Esq., Consul at Amsterdam.	1. A prevailing opinion that the decimal system would be beneficial for arithmetical purposes, &c. 2. The deterioration of the coin by unlawful practices (clipping), and the greater convenience of the decimal system.	1. Great confusion and inconvenience were experienced in having too many coins of different practical values; felt in paying and receiving, and also in account keeping. 2. Chiefly by labouring classes.	The florin was retained as the unit, but was decimally divided; the excellent working of the decimal system in France being acknowledged, and the new mode of calculation having been familiar, by instruction at the public schools.	The change in accounts was compulsory and immediate, and enforced by law. The old system was entirely discontinued. The coins were changed gradually.	1. In popular language, among the lower classes only. The old denominations are still used, but rarely. 2. Most effectual.	1. The change was accomplished without unpopularity or uneasiness. 2. Rather unpopular with unlettered and old; but this feeling has been transitory. The Dutch are for the most part opposed to innovations.	Certainly more convenient both in large and small payments.
GREECE - - H.M. Minister at Athens.	The phœnix was adopted at the separation of Greece from Turkey, by the President Capodistrias. When the Government was settled it was necessary again to fix on a monetary system.	No inconvenience was felt, as neither the phœnix nor the drachme have ever existed in quantities sufficient to meet the requirements of trade.	The phœnix did not contain the legal quantity of silver.	Immediate and compulsory. The use of old or Turkish was under penalty of fine and confiscation; but, notwithstanding this, accounts were kept for several years in piastres and paras.	Accounts are now universally kept in drachme and lepta, except in some of the border villages of Northern Greece. The copper coins only are in existence; no gold or silver.	The change was decidedly popular.	If the coins really existed it would be very convenient; as it is, there is inconvenience, for the copper coinage only exists, and every denomination of foreign coin circulates at values fixed by law.
UNITED STATES 1. T. R. Snowden, Esq., Director of Mint of U.S. 2. Edw. Everett, Esq.	1. The necessity and the constitutional duty imposed on Congress of establishing an uniform currency for the States at the separation of the States from the mother country. 2. The uncertain valuation of foreign coins which filled the channels of circulation, and the superior simplicity of the decimal notation.	1. The different value assigned to the old currency in the several States which created inconvenience and confusion, and the complexity of a system which has an irregular ratio of multiplication and division. Felt by all classes in paying and receiving and account keeping. 2. All the inherent inconveniences of the pound sterling and its subdivisions, with the additional complications of the various colonial currencies.	1. The people were familiar with the Spanish dollar. The decimal division of it was the result of an abstract preference for a decimal system. 2. The dollar was not adopted from any preference of the decimal system, for it was not so divided. The decimal system was adopted from considerations of convenience and simplicity.	Compulsory and immediate for all federal courts and offices. The law did not operate in respective State Governments. These came to the aid of the Federal Government by special legislation, but at intervals varying from two to twenty years, and consequently the banishment of the old pound unit was but slowly effected. 2. It was compulsory on public officers but on no others.	1. Effectual, as to abandonment of £ sterling and use of dollars and cents, but not as to use of mills. Fractions of cents are expressed binarily. The old Spanish silver coinage of $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ of a dollar, expressing 25, $12\frac{1}{2}$, $6\frac{1}{4}$ cents, still circulate and are used in market transactions. 2. It was gradually adopted by the people, but one occasionally hears the old denominations, because we retain the coins $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ of a dollar. Shopkeepers more readily say two shillings and sixpence than $37\frac{1}{2}$ cents.	1. The change was popular with all classes, but notwithstanding the habits of the people were very slowly supplanted, although the advantages of the new system were unanimously conceded. 2. The simplicity and beauty of the decimal system were immediately felt by all. The change not being compulsory could have aggrieved no one.	1. Far more convenient. The unit is sufficiently large to be represented in a gold coin, and its hundredth part is small enough to represent the least price at which it is desired to sell by retail. 2. There is some trifling inconvenience in the concurrent popular use of the binary divisions of the dollar, but these are instantly converted into cents in the mind of buyer and seller.

No. 54.
Values of Coins.

No. 54.

NOTES on the relative WEIGHTS and VALUES of the principal ENGLISH and FOREIGN COINS (*prepared for the use of the Decimal Coinage Commission*).

As some schemes for Decimal Coinage propose alterations in the value of some of the present coins, either for the purpose of assimilating them to foreign coinages or for other purposes, the following notes are intended to assist in judging of the effect of such changes.

ENGLAND.

Since a time anterior to the 43d of Elizabeth all English silver coin has been of the standard of 11oz. 2dwt. fine, and 18dwt. alloy, or $\frac{37}{40}$ fine, all English gold coin of the standard of 11oz. fine and 1oz. alloy, or $\frac{11}{12}$ths. fine.

From the 43d of Elizabeth, down to the year 1816, 1lb. troy of standard silver was coined into sixty-two shillings. Until 14 Geo. 3. c. 42. it was a legal tender for any amount after that Act to the amount of 25*l.*

In the 43d of Elizabeth, the gold sovereign or piece of 20*s.*, contained 171·940 grains of standard gold, giving the relative values of gold and silver as 10·904 to 1, or 2*l.* 15*s.* 10*d.*, as the price of an ounce of standard gold.

As the value of gold relatively to that of silver increased the amount of gold in the gold coinage was from time to time diminished, or the value of the gold coinage raised, both gold and silver being a legal tender, until in the 18 Charles II. the gold-piece called the guinea was coined containing $\frac{1}{44.5}$ of a pound troy, or $129\frac{3}{8}\frac{9}{9}$ grains of standard gold. This was originally intended to be of the value of 20 shillings, but its value was not then fixed by any Royal proclamation; and the value of gold relatively to silver still rising, it circulated at a higher value determined by usage. In 1717 it was current by usage for 21*s.* 6*d.*, giving 3*l.* 19*s.* $8\frac{3}{4}$*d.* as the price of an ounce of standard gold, and the relative values of gold and silver, as 15·57 to 1.

Gold being overvalued relatively to silver, the silver coinage was disappearing, and the method of preventing the melting down of the silver coinage was referred to Sir Isaac Newton, then Master of the Mint, who, in a report made to the Lords of the Treasury, dated the 21st September 1717, showed that the commercial values of gold and silver in Europe were as 14·8 or 15 to 1, giving the value of the guinea from 20*s.* 5*d.* to 20*s.* $8\frac{1}{2}$*d.* He recommended that 6*d.* should be taken off the value of the guinea. This was accordingly done in 1718 by a Royal proclamation, and the guinea was made a legal tender for 21 shillings, giving 46*l.* 14*s.* 6*d.* as the price of 1lb. troy of standard gold, and 3*l.* 17*s.* $10\frac{1}{2}$*d.* as the price of one ounce of standard gold, the price which it has ever since retained.

This gave the relative values of gold and silver as 15·2096 to 1. Gold was still somewhat over-valued, and it became in consequence the principal coin. Silver coins, rubbed and worn down below their nominal relative value to gold, circulated as change.

From 1718 to 1774 both gold and silver were a legal tender. After 1774 silver, as above mentioned, was only a legal tender for sums not exceeding 25*l.*

This state of the coinage continued until the year 1816, when, by the Act of 56 Geo. 3. c. 68. the present system was established, by which the pound troy of silver is coined into 66 shillings, but silver coin is a legal tender only for sums not exceeding 40 shillings.

Since the 18 Charles II. c. 5. there has been no seignorage on any coin coined at the English Mint. Since 1816 silver has only been coined for the Government.

The comparison of the values of the silver and gold coins of a country involves the relative values of silver and gold in that country.

This may be either stated as a ratio, as in the preceding part of this paper, or it may be conveniently stated by giving the price per ounce of English standard silver to which it is equivalent. These are connected by the following equation:—

Let r be the ratio.

p the price in pence of one ounce of standard silver ($\frac{37}{40}$ fine).

$$\therefore \quad r\,p = \tfrac{37}{40} \times \tfrac{12}{11} \times 934\tfrac{1}{2} = 942{\cdot}9954 \qquad \log. = {\cdot}9745096.$$

This gives the following table:—

Price per Ounce of Standard Silver - - - -	59*d.*	60*d.*	60·83*d.*	61*d.*	62*d.*	63*d.*	64*d.*	65*d.*	66*d.*
Value of Fine Gold, Value of Fine Silver being = 1	15·983	15·716	15·5	15·458	15·210	14·968	14·734	14·508	14·2878

No. 54. Values of Coins.

For the comparison of coins expressed in the weights of the metrical scale and in troy weight we have the following determination of the relation between the kilogram and the troy grain, made by Professor Miller for the Commissioners of Weights and Measures.—See "Philosophical Magazine," January 1857.

1 kilogram = 15432·34874 grains. log. = ·1884320

This gives—

1 grain	= ·064799	grammes.	log. = ·8115680
1 dwt.	= 1·55517	„	log. = ·1917792
1 oz.	= 31·1035	„	log. = ·4928092
1 lb. troy	= 373·242	„	log. = ·5719904

From the above data we have—

English Gold Coins.

1 lb. troy of gold $\frac{11}{12}$ths fine = 44½ guineas = 46*l.* 14*s.* 6*d.*
1 oz. „ „ = 3*l.* 17*s.* 10½*d.*
£1 = $123\frac{1}{6}\frac{7}{2}\frac{1}{3}$ grains gold $\frac{11}{12}$ths fine, log. = ·0908732
= 7·98806 grammes do. „ = ·9024412
= $113\frac{1}{6}\frac{}{2}\frac{}{3}$ grains, fine gold „ = ·0530845
= 7·3224 grammes, do. „ = ·8646527
No retention made for seignorage.

English Silver Coins.

1 lb. troy silver $\frac{37}{40}$ fine = 66 shillings.
1 oz. „ „ = 66 pence.
1 shilling = $87\frac{3}{11}$ grains silver $\frac{37}{40}$ths fine, log. = ·9408785
= 5·65518 grammes do. „ = ·7524465
= $80\frac{8}{11}$ grains, fine silver „ = ·9070203
= 5·23104 grammes do. „ = ·7185883

FRANCE.

The franc contains 5 grammes of silver $\frac{9}{10}$ths fine. For the expense of coinage a seignorage of 1·50 francs is retained out of every kilogram of silver or out of 200 francs. Gold is coined at 15·5 times the value of silver. For the expense of coinage a seignorage of 6·70 francs is retained out of every kilogram of gold, or out of 3,100 francs.

This gives—

SILVER.—*Intrinsic Values.*

1 franc = 5 grammes silver $\frac{9}{10}$ths fine.
= 77·16175 grains, do. log. = ·8874020
= 4·5 grammes fine silver.
= 69·4456 grains, do. log = ·8416446

Taking seignorage into account:

1000 grammes silver $\frac{9}{10}$ths fine = 198·50 francs.
1 franc = 5·0378 grammes silver $\frac{9}{10}$ths fine, log. = ·7022395
= 4·534 grammes, fine silver, log. = ·6564820

Comparison of Intrinsic Values of Franc and Shilling:

1 shilling = 1·16245 francs, log. = ·0653757
1 franc = 0·86025 shilling, log. = ·9346243

GOLD.—*Intrinsic Values.*

Napoleon of 20 francs = $\frac{1000}{155}$ grammes gold $\frac{9}{10}$ths fine.
= 6·4516 do. do. log. = ·8096683
= 99·5636 grains do. „ = ·9981003
= $\frac{900}{155}$ grammes fine gold.
= 5·8064 do. do. „ = ·7639108
= 89·6072 grains do. „ = ·9523428
10 francs = 3·2258 grammes gold $\frac{9}{10}$ths fine, „ = ·5086383
= 49·7818 grains do. „ = ·6970703
= 2·9032 grammes fine gold „ = ·4628808
= 44·8036 grains do. „ = ·6513128
25 francs = 8·0645 grammes gold $\frac{9}{10}$ths fine „ = ·9065783
= 124·4545 grains do. „ = ·0950103
= 7·2580 grammes fine gold „ = ·8608208
= 112·009 grains do. „ = ·0492528

Values taking seignorage into account:

1,000 grammes gold bullion $\frac{9}{10}$ths fine = 3093·30 francs.
10 francs = 3·2328 grammes gold bullion $\frac{9}{10}$ ths fine, log. = ·5095780
= 2·9095 „ fine gold bullion „ = ·4638205

No. 54. Values of Coins.

Comparison of intrinsic values of francs (in gold) and sovereign:

£1 = 25·2215 francs, log. = ·4017719

10 francs = £0·396486, log. = ·5982281

Franc = 9·5156*d.*

Comparison of values of franc (in gold) and sovereign, taking the seignorage on the French gold coinage into account:

£1 = 25·16705 francs, log. = ·4008322

Franc = 9·5363*d.*

SARDINIA.

The silver and gold coinage is the same as in France, the unit, the lira di Piemonte, being the same as the franc, except that the retention for seignorage is in silver 2·45 lire out of 200 lire, in gold 7·60 out of 3,100 lire.

Hence, *taking seignorage into account,*—

1,000 grammes silver bullion $\frac{9}{10}$ths fine = 197·55 lire

1 lira = 5·062 grammes silver bullion $\frac{9}{10}$ths fine, log. = ·7043230

= 4·556 „ fine silver bullion „ = ·6585655

1,000 grammes gold bullion $\frac{9}{10}$ths fine = 3092·40 lire

10 lire = 3·2337 grammes gold bullion $\frac{9}{10}$ths fine, log. = ·5097043

= 2·9103 „ fine gold bullion, „ = ·4639468

£1 = 25·1597 lire.

1 lira = 9·5390*d.*

BELGIUM.

No gold coinage.

The silver coinage in weight, standard and seignorage is the same as that of France.

SWITZERLAND.

No gold coinage.

The silver coinage in weight and standard is the same as that of France.

LOMBARDY.

Both gold and silver are a legal tender.

Silver.

Lira Austriaca = 4·330$\frac{2}{7}\frac{5}{7}$ grammes silver, $\frac{9}{10}$ths fine.
= 66·836 grains do.
= 3·89783 grammes fine silver.
= 60·1526 grains do.
= 0·8662 francs.

Gold.

$\frac{1}{4}$ sovrano = 20 lire = 5·666 grammes gold, $\frac{9}{10}$ths fine.
= 87·44 grains do.
= 5·0994 grammes fine gold.
= 78·696 grains do.

Lira (gold) = 8·35626*d.*

This gives the relative values of gold and silver as 15·2875 to 1, equivalent to a price of 61·6861*d.* per oz. of English standard silver.

TWO SICILIES.

No gold coinage.

Ducat = 22·943 grammes silver, $\frac{8}{9}$ths fine.
= 19·119 grammes fine silver.
= 295·05 grains do.
= 4·25 francs.

TUSCANY.

No gold coinage.

Lira = 3·9443 grammes silver, ·958 fine.
= 3·7786 grammes fine silver.
= 58·313 grains do.
= 0·84 francs.

NETHERLANDS.

On the union of Holland and Belgium by a law of the 28th September 1816, a new monetary unit was established for both countries, represented by the florin, containing 9·613 grammes of fine silver, equal in value to the ancient florin of the United Provinces, and a ten-florin piece containing 6·0561 grammes of fine gold.

This gave the relative values of gold and silver as 15·873 to 1, equivalent to a price of 59·408*d.* per oz. of English standard silver.

Silver being undervalued went out of circulation, to remedy which, by the law of 22d March 1839, the quantity of fine silver in the florin was reduced to 9·45 grammes, or 145·83 grains.

This gave the relative values of gold and silver as 15·604 to 1, equivalent to a price of 60·432*d.* per oz. of English standard silver.

Finally, by the law of 26th November 1847, gold ceased to be a legal tender.

The florin containing 9·45 grammes fine silver, and 0·55 grammes alloy, and weighing 10 grammes, and equal in value to 2·10 francs, became the sole monetary unit.

The seignorage was fixed at 1·20 florin per kilogram; therefore, taking the seignorage into account,—

945 grammes fine silver bullion = 98·80 florins.
1 florin = 9·5647 grammes fine silver bullion.
= 10·121 grammes silver bullion ·945 fine.

PORTUGAL.

By the law of 24th April 1835 both gold and silver were legal tenders.

Silver.

1 milreis = 1$000 = 29·608 grammes silver, $\frac{11}{12}$ths fine
= 456·92 grains do.
= 27·141 grammes fine silver.
= 418·85 grains do.
= 6·03 francs.

Gold.

1 milreis = 1$000 = 1·912 grammes gold, $\frac{11}{12}$ths fine.
= 29·506 grains do.
= 1·753 grammes fine gold.
= 27·047 grains do.
= 57·44*d.*
£1 = 4$178

This gives the relative values of gold and silver as 15·484 to 1, equivalent to a price of 60·901*d.* per oz. of English standard silver.

By the law of 15th February 1851, the silver coin was not altered. The gold coin was depreciated, so that,—

1 milreis = 1$000 = 1·793 grammes gold, $\frac{11}{12}$ths fine.
= 27·670 grains do.
= 1·644 grammes fine gold.
= 25·364 grains do.

This gives the relative values of gold and silver as 16·513 to 1, equivalent to a price of 57·106*d.* per oz. of English standard silver.

Finally, by the law of the 29th of July 1854, silver was reduced to a token coinage, and made a legal tender to the amount of 5$000 only. The value of the gold coinage was slightly reduced, so that the English sovereign should be current for 4$500 exactly.

Under this law,—

Gold.

Milreis = 1$000 = 1·7735 grammes gold, $\frac{11}{12}$ths fine.
= 27·370 grains do.
= 1·6257 grammes fine gold.
= 25·089 grains do.
= 53·28*d.*
£1 = 4$504.

The seignorage on the coinage of gold was fixed at 1$000 per kilogram, or 1·7735 per thousand.

This gives, taking the seignorage into account,—

1773·5 grammes gold bullion, $\frac{11}{12}$ths fine = 998·2265 milreis.
1 milreis = 1$000 = 1·77665 grammes gold bullion, $\frac{11}{12}$ths fine.
English sovereign = 4$496

Silver.

Legal tender to the amount of 5$000 only.

Milreis = 1$000 = 25 grammes silver, $\frac{11}{12}$ths fine.

This gives the relative values of gold and silver as 14·096 to 1, equivalent to a price of 66·896*d.* per oz. of English standard silver.

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Values of Coins.

RUSSIA.

Both gold and silver a legal tender.

Silver.

Ruble = 20·724 grammes silver, $\frac{8}{9}\frac{3}{6}\frac{1}{6}$ths fine.
= 17·99 grammes fine silver.
= 277·62 grains do.
= 3·998 francs.

Gold.

Imperial = 10·30 rubles = 13·09 grammes gold, $\frac{1}{1}\frac{1}{2}$ths fine.
= 202·01 grains do.
= 12 grammes fine gold.
= 185·18 grains do.
Hence ruble (gold) = 38·18*d.* "

These values give the relative values of gold and silver as 15·45 to 1, equivalent to a price of 61·035*d.* per oz. of English standard silver.

GREECE.

No gold coinage.

Silver Coins.

Drachme = 4·477 grammes silver, $\frac{9}{1}\frac{0}{0}$ths fine.
= 69·09 grains do.
= 4·0293 grammes fine silver.
= 62·181 grains do.
= ·8954 francs.

UNITED STATES OF AMERICA.

The dollar of the United States of America was originally equivalent to $24\frac{3}{4}$ grains of fine gold, or $371\frac{1}{4}$ grains of fine silver.

The reasons for the selection of these amounts appear from the following extracts from a Paper communicated to the House of Representatives of the United States on the 28th of January 1791, by Alexander Hamilton, Secretary of the Treasury.—See American State Papers (Finance), vol. i. p. 91.

" That species of coin (the dollar) has never had any settled or standard value according to " weight or fineness, but has been permitted to circulate by tale without regard to either, " very much as a mere money of convenience, while gold has had a fixed price by weight, " and with an eye to its fineness. This greater stability of the value of the gold coins is " an argument of force for regarding the money unit as having been hitherto virtually " attached to gold rather than to silver.

" 24 grains and $\frac{6}{8}$ths of a grain of fine gold have corresponded with the nominal value " of the dollar in the several states, without regard to the successive diminutions of its " intrinsic worth." * * * * *

* * The new dollar (of Spain) appears to contain about 368 grains of fine silver, " and that which immediately preceded it about 374." * *

" A resolution of Congress of the 6th of July 1785 declares that the money unit of " the United States shall be a dollar; and another resolution of the 8th of August 1786 " fixes that dollar at 375·64 grains of fine silver. The same resolution, however, deter- " mines that there shall also be two gold coins, one of 246·268 grains of pure gold equal " to 10 dollars, the other of half that quantity of pure gold equal to 5 dollars." * *

" Contrary to the ideas which have heretofore prevailed in the suggestions concerning a " coinage for the United States, though not without much hesitation arising from a " deference for those ideas, the Secretary is upon the whole strongly inclined to the " opinion that a preference ought to be given to neither of the metals for the money " unit." * * * * * * *

" If, then, the unit ought not to be attached exclusively to either of the metals, the " proportion which ought to subsist between them and the coins becomes a preliminary inquiry in order to its proper adjustment. * * * * *

" " The ratio of 1:15 will probably be found the most eligible." * * * *

" 1 part alloy to 11 parts fine, whether gold or silver, appears to be a convenient rule." * * * * * *

" The conclusion to be drawn from the observations which have been made on the " subject is this,—

" That the unit in the coins of the United States ought to correspond with $24\frac{3}{4}$ grains of " pure gold, and with $371\frac{1}{4}$ grains of pure silver, each answering to a dollar in the money " of account. The former is exactly agreeable to the present value of gold, and the latter " is within a small fraction of the mean of the last emissions of dollars, the only ones

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Values of Coins.

" which are now to be found in common circulation, and of which the newest is in the " greatest abundance. The alloy in each case to be $\frac{1}{12}$th of the total weight, which will " make the unit 27 grains of standard gold and 405 grains of standard silver."

In accordance with these recommendations, by the Act of 2d April 1792, a silver dollar was directed to be coined containing 371¼ grains of fine silver, and a gold coin, the eagle, of 10 dollars, containing 247½ grains of fine gold.

This gives (comparing the pound sterling with the dollar in gold),—

£1 = $4·5657
$1 = £0·219023
= 52·56552*d.*

By an Act of Congress of 28th June 1834 the amount of fine gold in the dollar was diminished to 23·2 grains.

This gave the relative values of gold and silver as 16 to 1, equivalent to a price of 58·937*d.* per oz. of English standard silver, and

£1 = $4·871
$1 = £0·205307
= 49·272*d.*

In 1837 the amount of gold in the dollar was raised to its present amount of 23·22 grains fine gold, or 25·8 grains of gold, $\frac{9}{10}$ths fine.

This gave the relative values of gold and silver as 15·988 to 1, which is equivalent to a price of 58.98*d.* per oz. of English standard silver, and

£1 = $4·86656
$1 = £0·205484
= 49·316*d.*

Finally, the rise in the value of silver relatively to gold, causing the silver coin to be exported and melted down, by the Act 21st February 1853, the silver coinage inferior to the dollar was reduced in weight, silver coins making up a dollar containing 345·6 grains of fine silver.

This gives the relative values of gold and silver as 14·888 to 1, equivalent to a price of 63·357 per oz. of English standard silver.

TABLE of the Value in Sterling Money of the Principal Foreign Silver Coins according to the Price per Ounce of English Standard Silver.

Name of Silver Coin.	Grains, Fine Silver.	Grammes, Fine Silver.	Value in Pence of Foreign Silver Coins. Price per Ounce of English Standard Silver.							
			59*d.*	60*d.*	61*d.*	62*d.*	63*d.*	64*d.*	65*d.*	66*d.*
Franc - - - -	69·4456	4·5	9·22	9·38	9·54	9·70	9·85	10·01	10·16	10·323
Lira Austriaca (Lombardy)	60·1526	3·89783	8·0	8·13	8·27	8·40	8·53	8·67	8·80	8·94
Lira Toscana (Tuscany) -	58·313	3·7786	7·75	7·88	8·01	8·14	8·27	8·40	8·53	8·66
Ducat (Two Sicilies) -	295·05	19·119	39·21	39·87	40·53	41·20	41·86	42·53	43·20	43·86
Florin (Netherlands) -	145·83	9·45	19·39	19·71	20·03	20·36	20·69	21·02	21·35	21·68
Drachme (Greece) - -	62·18	4·0239	8·26	8·40	8·54	8·68	8·82	8·96	8·10	9·24
Ruble (Russia) - -	277·62	17·99	36·88	37·50	38·12	38·75	39·37	40·00	40·62	41·25
Dollar (United States) -	371·25	24·057	49·34	50·17	51·0	51·84	52·67	53·51	54·35	55·19
Shilling - - - -	$80\frac{8}{11}$	5·23104	$10\frac{8}{11}$	$10\frac{10}{11}$	$11\frac{1}{11}$	$11\frac{3}{11}$	$11\frac{5}{11}$	$11\frac{7}{11}$	$11\frac{9}{11}$	12

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No. 55.
Sir Isaac Newton, Report, &c.

REPORT from Sir ISAAC NEWTON, Master of the Mint, (in pursuance of which the price of Standard Gold was fixed at 3*l.* 17*s.* 10½*d.* per ounce.)

TO THE RIGHT HONOURABLE THE LORDS COMMISSIONERS OF HIS MAJESTY'S TREASURY.

May it please your Lordships,—

IN obedience to your Lordships Order of Reference of August 12th, that I should lay before your Lordships a state of the gold and silver coins of this kingdom in weight and fineness, and the value of gold in proportion to silver, with my observations and opinion, and what method may be best for preventing the melting down of the silver coin, I humbly represent, that a pound weight troy of gold eleven ounces fine and one ounce alloy is cut into 44½ guineas, and a pound weight of silver eleven ounces two pennyweights fine and eighteen pennyweights alloy is cut into 62 shillings. And according to

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this rate, a pound weight of fine gold is worth fifteen pounds weight six ounces seventeen pennyweights and five grains of fine silver, reckoning a guinea at 1*l.* 1*s.* 6*d.* in silver money. But silver in bullion exportable is usually worth 2*d.* or 3*d.* per ounce more than in coin. And if at a medium such bullion of standard alloy be valued at 5*s.* 4½*d.* per ounce, a pound weight of fine gold will be worth but 14 lb. 11 oz. 12 dwt. 9 gr. of fine silver in bullion. And at this rate a guinea is worth but so much silver as would make 20*s.* 8*d.* When ships are lading for the East Indies, the demand of silver for exportation raises the price to 5*s.* 6*d.* or 5*s.* 8*d.* per ounce or above; but I consider not those extraordinary cases.

A Spanish pistole was coined for 32 rials or four pieces of eight rials, usually called pieces of eight, and is of equal alloy and the sixteenth part of the weight thereof. And a doppio moeda of Portugal was coined for ten crusados of silver, and is of equal alloy and the sixteenth part of the weight thereof. Gold is therefore in Spain and Portugal of sixteen times more value than silver of equal weight and alloy according to the standard of those kingdoms; at which rate a guinea is worth 22*s.* 1*d.* But this high price keeps their gold at home in good plenty, and carries away the Spanish silver into all Europe; so that at home they make their payments in gold, and will not pay in silver without a premium. Upon the coming in of a plate fleet, the premium ceases or is but small; but as their silver goes away and becomes scarce the premium increases, and is most commonly about six per cent., which being abated, a guinea becomes worth about 20*s.* 9*d.* in Spain and Portugal.

In France a pound weight of fine gold is reckoned worth fifteen pounds weight of fine silver. In raising or falling their money, their Kings' Edicts have sometimes varied a little from this proportion in excess or defect; but the variations have been so little that I do not here consider them. By the Edict of May 1709 a new pistole was coined for four new Louises, and is of equal alloy and the fifteenth part of the weight thereof, except the errors of their mints. And by the same Edict fine gold is valued at fifteen times its weight of fine silver; and at this rate a guinea is worth 20*s.* 8½*d.* I consider not here the confusion made in the monies in France by frequent Edicts to send them to the mint and give the King a tax out of them. I consider only the value of gold and silver in proportion to one another.

The ducats of Holland and Hungary and the Empire were lately current in Holland among the common people in their markets and ordinary affairs at five guilders in specie and five stivers, and commonly changed for so much silver monies in three guilder pieces and guilder pieces, as guineas are with us for 21*s.* 6*d.* sterling; at which rate a guinea is worth 20*s.* 7½*d.*

According to the rates of gold to silver in Italy, Germany, Poland, Denmark, and Sweden, a guinea is worth about 20*s.* 7*d.*, 6*d.*, 5*d.*, or 4*d*, for the proportion varies a little within the several governments in those countries. In Sweden gold is lowest in proportion to silver, and this hath made that kingdom, which formerly was content with copper money, abound of late with silver, sent thither (I suspect) for naval stores.

In the end of King William's reign and the first year of the late Queen, when foreign coins abounded in England, I caused a great many of them to be assayed in the mint, and found by the assays that fine gold was to fine silver in Spain, Portugal, France, Holland, Italy, Germany, and the Northern Kingdoms, in the proportions above mentioned, errors of the mints excepted.

In China and Japan one pound weight of fine gold is worth but nine or ten pounds weight of fine silver; and in East India it may be worth twelve. And this low price of gold in proportion to silver carries away the silver from all Europe.

So then by the course of trade and exchange between nation and nation in all Europe, fine gold is to fine silver as 14$\frac{4}{5}$ or 15 to 1; and a guinea at the same rate is worth between 20*s.* 5*d.* and 20*s.* 8½*d.* except in extraordinary cases, as when a plate fleet is just arrived in Spain, or ships are lading here for the East Indies, which cases I do not here consider. And it appears by experience, as well as by reason, that silver flows from those places where its value is lowest in proportion to gold, as from Spain to all Europe and from all Europe to the East Indies, China, and Japan; and that gold is most plentiful in those places in which its value is highest in proportion to silver, as in Spain and England.

It is the demand for exportation which hath raised the price of exportable silver about 2*d.* or 3*d.* in the ounce above that of silver in coin, and hath thereby created a temptation to export or melt down the silver coin rather than give 2*d.* or 3*d.* more for foreign silver. And the demand for exportation arises from the higher price of silver in other places than in England in proportion to gold, that is, from the higher price of gold in England than in other places in proportion to silver; and therefore may be diminished by lowering the value of gold in proportion to silver. If gold in England or silver in East India could be brought down so low as to bear the same proportion to one another in both places, there would be here no greater demand for silver than for gold to be exported to India. And if gold were lowered, only so as to have the same proportion to the silver money in England which it hath to silver in the rest of Europe, there would be no temptation to export silver rather than gold to any other part of Europe. And to compass this last there seems nothing more requisite than to take of about 10*d.* or 12*d.* from the guinea, so that gold may bear the same proportion to the silver money in England which it ought to do by the course of trade and exchange in Europe. But if

only 6*d.* were taken off at present, it would diminish the temptation to export or melt down the silver coin, and by the effects would show hereafter, better than can appear at present, what further reduction would be most convenient for the public.

In the last year of King William, the dollars of Scotland, worth about 4*s.* 6½*d.*, were put away in the north of England for 5*s.*, and at this price began to flow in upon us. I gave notice thereof to the Lords Commissioners of the Treasury, and they ordered the collectors of taxes to forbear taking them, and thereby put a stop to the mischief.

At the same time the Louis d'ors of France, which were worth but seventeen shillings and three farthings apiece, passed in England at 17*s.* 6*d.* I gave notice thereof to the Lords Commissioners of the Treasury, and His late Majesty put out a proclamation that they should go but at 17*s.*, and thereupon they came to the mint and 1,400,000*l.* were coined out of them. And if the advantage of 5¼*d.* in a Louis d'or sufficed at that time to bring into England so great a quantity of French money, and the advantage of three farthings in a Louis d'or to bring it to the mint the advantage of 9½*d.* in a guinea or above may have been sufficient to bring in the great quantity of gold which hath been coined in these last fifteen years without any foreign silver.

Some years ago the Portuguese moidores were received in the west of England at 28*s.* apiece. Upon notice from the mint that they were worth only about 27*s.* 7*d.*, the Lords Commissioners of the Treasury ordered their receivers of taxes to take them at no more than 27*s.* 6*d.* Afterwards many gentlemen in the west sent up to the Treasury a petition that the receivers might take them again at 28*s.*, and promised to get returns for this money at that rate, alleging that when they went at 28*s.* their country was full of gold which they wanted very much. But the Commissioners of the Treasury, considering that at 28*s.* the nation would lose 5*d.* apiece, rejected the petition. And if an advantage to the merchant of 5*d.* in 28*s.* did pour that money in upon us, much more hath an advantage to the merchant of 9½*d.* in a guinea or above been able to bring into the mint great quantities of gold without any foreign silver, and may be able to do it still, till the cause be removed.

If things be let alone till silver money be a little scarcer, the gold will fall of itself, for people are already backward to give silver for gold, and will in a little time refuse to make payments in silver without a premium, as they do in Spain, and this premium will be an abatement in the value of the gold. And so the question is, whether gold shall be lowered by the government or let alone till it falls of itself by the want of silver money.

It may be said that there are great quantities of silver in plate, and if the plate were coined there would be no want of silver money. But I reckon that silver is safer from exportation in the form of plate than in the form of money, because of the greater value of the silver and fashion together. And therefore I am not for coining the plate till the temptation to export the silver money (which is a profit of 2*d.* or 3*d.* an ounce) be diminished. For as often as men are necessitated to send away money for answering debts abroad, there will be a temptation to send away silver rather than gold, because of the profit, which is almost four per cent. And for the same reason foreigners will choose to send hither their gold rather than their silver.

All which is most humbly submitted to your Lordships' great wisdom.

(Signed) Isaac Newton.

Mint Office, 21st Sept. 1717.

Note.—In pursuance of this report and of an address from the House of Commons a Royal Proclamation was issued making the guinea a legal tender for twenty shillings. This gave the value of the pound troy of standard gold 46*l.* 14*s.* 6*d.*, and of the ounce of standard gold 3*l.* 17*s.* 10½*d.*, the value which it has ever since retained.

No. 55.
List of
Books, &c.

No. 55.

LIST OF

BOOKS, PAMPHLETS, LETTERS, AND ARTICLES ON DECIMAL COINAGE,

Communicated by Dr. John Edward Gray, F.R.S., F.L.S., &c., of the British Museum, and chiefly in his Collection.

The Works are arranged chronologically; those of each year alphabetically, according to the Name of the Author.
The Letters in the Newspapers are arranged chronologically, after the Works of each Year.

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—— Rapport fait à l'Académie des Sciences, sur le Choix d'une Unité de Mesures. Par MM. Borda, Lagrange, Laplace, Monge, et Condorcet. "Hist. de l'Acad. Royale des Sciences." Ann. 1788. p. 7.

—— Exposé des Travaux de l'Académie sur le Projet de l'Uniformité des Mesures et des Poids. "Hist. de l'Acad. des Sciences." 1788. p. 17.

—— Rapport fait à l'Académie des Sciences, sur le Systeme Général des Poids et Mesures. Par les Citoyens Borda, Lagrange, et Monge. "Hist. de l'Acad. des Sciences." Ann. 1789. (1793, p. 1.)

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QUESTIONS

COMMUNICATED BY

LORD OVERSTONE

TO THE

DECIMAL COINAGE COMMISSIONERS,

WITH

ANSWERS.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1857.

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REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, Your Majesty's Commissioners for considering how far it may be practicable and advisable to introduce the principle of Decimal Coinage into the Coinage of the United Kingdom, humbly beg to submit to Your Majesty the following Statement:—

In our First and preliminary Report we stated that a series of questions had been laid before us, prepared by one of our number, Lord Overstone, described by their author as being drawn up with a view of bringing under distinct notice and examination some of the advantages of the present system of coinage, and some of the principal difficulties and objections which have been suggested with respect to the introduction of a system of Decimal Coinage.

We further stated, that we did not consider that it would be expedient that the Commission should express, or that any grounds should be given to infer, an opinion on the subject of that paper, and that, therefore, we felt it would be open to misconception if it were made part of our Appendix, but that we had directed it to be printed as a separate document communicated to the Commission by its framer, and humbly submitted to Your Majesty.

Since the publication of that Report, a number of papers of great value, some in the form of answers to the questions drawn up by Lord Overstone, and others in the form of dissertations on points suggested by those questions, have been communicated to us.

In pursuance of the course adopted by us with regard to the questions themselves, and with the view of further promoting the purpose for which the questions, as stated by the framer of them, had been drawn up, namely, the thorough and effectual investigation of the validity or invalidity of the arguments submitted by the opponents of the proposed change, we have directed these answers, and other papers so communicated to us, to be printed, and we now humbly submit them for Your Majesty's gracious consideration.

MONTEAGLE. L.S.

OVERSTONE. L.S.

J. G. HUBBARD. L.S.

QUESTIONS

Lord Overstone.

Drawn up with the view of bringing under distinct Notice and Examination some of the Advantages of our present System of Coinage, and some of the principal Objections and Difficulties which have been suggested with respect to the proposed introduction of the Decimal Principle.

They are to be understood as intended to promote a thorough and effectual investigation of the validity or invalidity of the arguments submitted by the opponents of the proposed change; and they are not to be taken as intimating any conclusive opinion on the points referred to.

"The best opportunity is thus (by written memoranda), afforded for a mature consideration of statements "made and of arguments adduced in support of (or in opposition to) measures proposed for consideration, and "the most effectual precaution taken against misconstruction and hasty inconsiderate decision."—*Peel Memoirs*, vol. II. p. 99.

I.

1. Do you think any change in our present system of Coins desirable?
2. On what grounds does your objection to our present system of Coins rest?
3. Do you consider them as defective or inconvenient for any of the purposes of Retail transactions, *i.e.* for paying or receiving? Or is your objection restricted to the inconvenience of our present Coinage for the purposes of Account keeping and Calculation?
4. What do you consider to be the primary purpose of Coins? Do you consider them as fractional subdivisions of the Integer created for the purpose of adjusting Retail payments? or do you consider their primary character to be that of Instruments the purpose of which is to facilitate Accounts and Calculation?
5. If one of those purposes must to some extent be sacrificed or made subordinate to the other, which do you think is entitled to the priority in our estimation?
6. Is not the Coinage chiefly concerned in the process of buying and selling by Retail? and must not the question of the merit or demerit of any system of Coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments? Are you aware of any complaint against our present system of Coins in this respect?

Is not *the use of the Coinage*, that is, the fitness of the Coins to perform their proper purpose of facilitating the division and distribution of Commodities in the Retail markets, and adjusting the small payments which arise, the consideration of primary importance, rather than the improvement of a system of Account keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

II.

7. Do you recommend the introduction of the *Decimal* principle into our Coinage?
8. Is it not impossible under the Decimal system to break the Integer into as many clear fractional parts as we now obtain under our present system of Coins? Do you not consider that this is an objection to the Decimal system?
9. In an old but very remarkable treatise on Coin and Coinage (Vaughan, 1675) this passage occurs:—

"Of all the numbers, Twelve is the most proper for Money, being the most clear "from fractions and confusion of Account, which ought not to be neglected, by "reason that of all other numbers it is most divisible, being divisible into units "as all numbers are; into two parts as no odd number is; into three parts as no "even number is but six, and the numbers that consist of sixes; into fourths, "into which six is not divisible; and into sixths."

In the memoir dictated by Napoleon at St. Helena, on the new French system is this passage:—

"On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux facteurs "2 et 5, et que 12 en a quatre, savoir, 2, 3, 4, et 6. Il est vrai que la numération "décimale, généralisée et exclusivement adaptée au mètre comme unité, donne "des facilités aux astronomes et aux calculateurs; mais ces avantages sont loin "de compenser l'inconvénient de rendre la pensée plus difficile. Le premier

" caractère de toute méthode doit être d'aider la conception et l'imagination,
" faciliter la mémoire, et donner plus de puissance à la pensée."

What validity is there in these considerations as objections to the introduction of a Decimal system of Coinage? Or, in what does the fallacy of them consist?

10. Must there not be an inferiority as regards fractional divisibility in any Decimal system of coins, as compared with a Coinage founded on a combination of the Binary with the Duodecimal scale?

11. Is there not great force and truth in the remark of Napoleon, that a Decimal system of dividing the Integer and of expressing the fractional parts, must be less favourable to distinctness of conception, to facility of recollection, and to readiness and ease in mental calculation, than a Binary or than our present system?

12. Ex. gr.: Which is the more easy for Conception, for Recollection, or for Addition mentally?—

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

Again; we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 375 mils?

The half of 2*s.* 6*d.* is 1*s.* 3*d.*, but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.*, 125 mils, &c. &c.?

Take another case. Any number of yards—7, 8, or 9 yards at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 mils per yard:

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market?

Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person, in his head, without pen and ink or pencil, and in the midst of confusion?

But try the same process upon the same sum in Decimal notation, namely, as 125 mils. Will the calculation be equally simple and easy?

Now try it in pence, namely, as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy?

Again: Price's Patent Candles are advertised in 12lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally? 12lb. boxes at 5·50 mils each; how much per lb.?

Again:

	s.	*d.*	Pence.	Mils.
1 yard or lb.	= 2	6	= 30	= 124, for more easy calculation than 125 mils.
$\frac{1}{2}$ do.	= 1	3	= 15	= 62
$\frac{1}{3}$ do.	= 0	10	= 10	= impossible.
$\frac{1}{4}$ do.	= 0	$7\frac{1}{2}$	= $7\frac{1}{2}$	= 31
$\frac{1}{6}$ do.	= 0	5	= 5	= impossible.
$\frac{1}{8}$ do.	= 0	$3\frac{3}{4}$	= $3\frac{3}{4}$	= impossible.
$\frac{1}{16}$ do.	= 0	3	= 3	= impossible.
$\frac{1}{12}$ do.	= 0	$2\frac{1}{2}$	= $2\frac{1}{2}$	= impossible.
$\frac{1}{15}$ do.	= 0	2	= 2	= impossible.
$\frac{1}{24}$ do.	= 0	$1\frac{1}{2}$	= $1\frac{1}{2}$	= impossible.
$\frac{1}{30}$ do.	= 0	1	= 1	= impossible.

Now, consider the comparative convenience in making the necessary payments.

2*s.* 6*d.* is paid with one Coin. How many Coins will be required to pay 124 mils?

1*s.* 3*d.* is paid with two Coins. How many Coins will be required to pay 62 mils?

Is it not by cases of this kind that the relative convenience of different systems of Coinage must be tested?

13. The defectiveness of any system founded on the Decimal principle consists in the imperfect divisibility of its Integers.

Is not the construction of Coinage necessarily a divisional process? Is it not the metrical subdivision of the Integer for fractional payments in connection with retail transactions?

" While decimal arithmetic for the purposes of " *computation* shoots spontaneously
" from the nature of man and things, it is not equally adapted to the numera-
" tion, the multiplication, or the division of material substances."—J. QUINCY ADAMS, *Secretary of State. Report to Senate of United States*, 1821, p. 8.

Lord Overstone.

14. In the following table compare the three systems, the present, the mil, and the penny system. With which does the superiority rest as regards,—

1. Number of figures used?
2. Conciseness of expression in words or in writing?
3. Facility for mental conception of the sum stated?
4. Tendency to promote accuracy in copying or calling over?
5. Facility for calculations, especially those which must be made in the head?
6. Interchangeability at equivalent value with the Coins now in use?

£	s.	d.		Mils.		Pence.
1	0	0	=	1,000	=	240
	17	8	=	883	=	212
	15	6	=	775	=	186
	9	9	=	487	=	117
	6	3	=	312	=	75
	5	7	=	279	=	67
	4	10	=	241	=	58
	3	8	=	183	=	44
	2	4	=	112	=	28
	1	5	=	70	=	17
4	7	0		4,342		1,044
27 figures.				34 figures.		28 figures.

If we now proceed to subject these total sums to division, which system will be found the most convenient?

4*l.* 7*s.*, divided by 3, 4, 6, and 12, gives the respective sums, 1*l.* 9*s.*, 1*l.* 1*s.* 9*d.*, 14*s.* 6*d.*, 7*s.* 3*d.*

Pence 1,044, divided by 3, 4, 6, and 12, gives the respective sums of 348 pence, 261 pence, 174 pence, 87 pence.

But 4,342 mils is not divisible without a remainder by any of these divisors.

15.

		s.	d.		Pence.		Mils.
1 £	=	20	0	=	240	=	1,000
$\frac{1}{2}$ £	=	10	0	=	120	=	500
$\frac{1}{3}$ £	=	6	8	=	80	=	—
$\frac{1}{4}$ £	=	5	0	=	60	=	250
$\frac{1}{5}$ £	=	4	0	=	48	=	200
$\frac{1}{6}$ £	=	3	4	=	40	=	—
$\frac{1}{7}$ £	=	—		=	—	=	—
$\frac{1}{8}$ £	=	2	6	=	30	=	125
$\frac{1}{9}$ £	=	—		=	—	=	—
$\frac{1}{10}$ £	=	2	0	=	24	=	100
$\frac{1}{11}$ £	=	—		=	—	=	—
$\frac{1}{12}$ £	=	1	8	=	20	=	—
$\frac{1}{13}$ £	=	—		=	—	=	—
$\frac{1}{14}$ £	=	—		=	—	=	—
$\frac{1}{15}$ £	=	1	4	=	16	=	—
$\frac{1}{16}$ £	=	1	3	=	15	=	—
$\frac{1}{17}$ £	=	—		=	—	=	—
$\frac{1}{18}$ £	=	—		=	—	=	—
$\frac{1}{19}$ £	=	—		=	—	=	—
$\frac{1}{20}$ £	=	1	0	=	12	=	50

By this table it appears that going down as far as the shilling the £ is divisible under our present system, and under the penny system, into eleven distinct aliquot parts; whilst under the mil system, it is divisible only into six aliquot parts.

But observe further the subdivisibility of the quotients obtained under the present and the penny system, compared with those obtained under the mil system.

The $\frac{1}{8}$ £ represented by 2*s.* 6*d.* or 30 pence, or 120 farthings, is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, giving respectively 1*s.* 3*d.*, 10*d.*, 7$\frac{1}{2}$*d.*, 6*d.*, 5*d.* &c.; whilst the same sum represented by 125 mils is divisible only by 5 and 25, giving as the result 25 mils and 5 mils.

Again: the $\frac{1}{10}$ £, represented by 2*s.* or 24 pence, or 96 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48, giving respectively 1*s.*, 8*d.*, 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1$\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, and $\frac{1}{2}$*d.*; whilst the same sum, represented by 100 mils, is not divisible into a third or an eighth part, or any of their subdivisions.

The same may be said again of the shilling, which, represented by 12 pence or 48 farthings, may be divided by 2, 3, 4, 6, 8, 12, 16, 24, giving respectively the sums 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1$\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, $\frac{1}{2}$*d.*; whilst the same shilling, represented by 50 mils, is divisible only by 2, 5, and 25, giving the sum 25 mils, 5 mils, and 2 mils.

Lord Overstone.

Now let us compare the three systems with reference to the number of figures requisite for stating the fractions of a £ which are obtainable under each of the three systems:—

		s. d.		Pence.		Mils.
1 £	=	20 0	=	240	=	1,000
$\frac{1}{2}$ £	=	10 0	=	120	=	500
$\frac{1}{4}$ £	=	5 0	=	60	=	250
$\frac{1}{5}$ £	=	4 0	=	48	=	200
$\frac{1}{8}$ £	=	2 6	=	30	=	125
$\frac{1}{10}$ £	=	2 0	=	24	=	100
$\frac{1}{20}$ £	=	1 0	=	12	=	50
		2 4 6		544		2,225
		19 figures.		19 figures.		25 figures.

III.

16. Is the introduction of the Decimal principle into our Coinage desirable without reference to what may be the System of Weights and Measures in this country?

17. Commodities are divided for the Retail purposes of the market by means of our Weights and Measures, and the practical purpose of Coins is to effect the payment for those Retail purchases. Can the adjustment of our System of Coinage be properly disconnected from the adjustment of our System of Weights and Measures?

18. At present our System of Weights and Measures, and our System of Coins, may be considered as Binary. Can it prove consistent with public convenience to abandon the Binary, and to adopt the Decimal system in our Coinage, unless we have decided on the same course in our System of Weights and Measures?

19. If the Retail transactions of the community originate in a System of Weights and Measures, by which the hundredweight is divided into 4 quarters, the quarter into 28 pounds, and the pound into 16 ounces; and in which, again, the lineal measure, the yard, is divided into 3 feet, and the foot into 12 inches: will a Coinage, founded on the Decimal principle of division, afford greater facility for the adjustment of such Retail transactions than the Coinage which now exists?

20. Take the case of an Article now selling at a shilling per pound or per yard, and retailed in halves, quarters, ounces, or inches, these fractional quantities are easily and readily paid for in our present Coins. But if our Coinage be subjected to the Decimal principle of division, will not that facility be lost?

21. Under our present system,—

			Mils.	Pence.
1lb.	=	one shilling	50	12
$\frac{1}{2}$lb.	=	sixpence	25	6
$\frac{1}{4}$ lb.	=	threepence	12·5	3
$\frac{1}{8}$ lb. or 2 ounces	=	three halfpence	6·25	$1\frac{1}{2}$
$\frac{1}{16}$ lb. or 1 ounce	=	three farthings	3·125	$\frac{3}{4}$

In cases of this kind, will the ordinary transactions of the market be carried on under a Decimal system with simplicity or convenience comparable to that which is obtained by the present system?

22. Would a change from our present to a Decimal system of Notation and of Coins secure any advantages in Brevity of Expression, in Facility of stating Accounts, in Simplicity of form, in Speed or Accuracy of Calculation, or in Facility of payments?

23. In the Report of the discussion, at the Institution of Civil Engineers, of Mr. Yates' Paper on the French system of Measures, Weights, and Coins, the following passage occurs (p. 60):—

"The pound sterling, consisting of 960 farthings, admits of 19 divisions* without "a remainder; but if divided into 1,000 parts, it only admits of 8 divisions. "Existing Weights and Measures are chiefly reckoned by 2, 4, 8, 12, 20, 24, 36, "&c., which admit of divisions by existing monies; but if a monetary decimal "system be adopted, without also adapting it to weights and measures, it "must be evident that the number of fractions will be greatly multiplied. "Decimal coins will not accord with the fractions of a pound of 16 ounces, nor "with those of a yard of 36 inches. Purchases of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, &c. of any integer "could not be paid for decimally without incurring a loss by fractions not "represented by Coins. Now those are precisely the quantities in which the "working classes principally make their purchases; consequently they would be "the chief sufferers by the introduction of a Decimal Coinage, unless there is

* Qy. 960 admits of 27 divisions, not 19; 1,000 of 15 divisions, not 8.

Lord Overstone.

" a simultaneous adoption of Decimal Weights and Measures. This anomaly " was severely felt in the United States, and to obviate the inconvenience, " Spanish pieces of $6\frac{1}{4}$ and $12\frac{1}{2}$ cents, although illegal coins, were of necessity " employed."

Must the truth and force of this statement be admitted, or, if not, what answer can be given to it?

24. In the retail transactions of the Shop or Market, is not division into halves quarters, thirds, eighths, twelfths, &c. more convenient, and more in unison with the natural habits of mankind, than the division into tenths?

"The decimal numbers, applied to the French weights and measures, form one of " its highest theoretic excellences. It has, however, been proved by the most " decisive experience in France, that they are not adequate to the wants of man " in society, and, for all the purposes of retail trade, they have been formally " abandoned. The convenience of decimal arithmetic is in its nature merely a " convenience of calculation; it belongs essentially to the keeping of accounts, " but is merely an incident to the transactions of trade. It is applied, therefore, " with unquestionable advantage, to monies of account, as we have done; " yet, even in our application of it to the *Coins*, we have not only found it " inadequate but in some respects inconvenient. The divisions of the Spanish " dollar, as a Coin, are not only into tenths, but into halves, quarters, fifths, " eighths, sixteenths, and twentieths. We have the halves, quarters, and " twentieths, and might have the fifths, but the eighth makes a fraction of the " cent, and the sixteenth even a fraction of a mill. These eighths and six- " teenths form a very considerable proportion of our metallic currency and " although the eighth, dividing the cent only into halves, adapts itself without " inconvenience to the system, the fraction of the sixteenth is not so tractable; " and in its circulation, as small change, it passes for six cents, though its value " is six and a quarter, and there is a loss by its circulation of four per cent. " between the buyer and the seller. For all the transactions of retail trade, " the eighth and sixteenth of a dollar are among the most useful and convenient " of our Coins; and, although we have never coined them ourselves, we should " have felt the want of them, if they had not been supplied to us from the " Coinage of Spain."—QUINCY ADAMS'S *Report to Senate of United States*, 1821, p. 81.

25. The late Lord Ashburton, in a debate in the House of Commons on this subject, remarked, "That the capacity of division by halves and quarters which attends " our shillings is extremely convenient for the common purposes of life, which " upon the whole is the best criterion of any system." Is this correct or otherwise?

How is the shilling expressed as 50 mils to be divided into quarters, or the sixpence expressed as 25 mils to be divided into halves?

26. It is stated by Sir John Herschel, in his evidence before the Committee of the House of Commons, (qu. 594,) that in his opinion "it is a great misfortune that " decimal coins will never fit the fractions of a yard and of pounds and of measures." Must we concur in that opinion, and if so, must we concur in the further view of Sir John Herschel, that "a Decimal System of Weights and Measures, as well as of Coins, ought to form a part of the same integral system"?

27. In the evidence given before the House of Commons Committee, Sir John Herschel gives his opinion, that the Decimalization of Weights and Measures and of Coins should go hand in hand (qu. 598); but if that be impracticable, he inclines to the opinion that Decimalization of Weights and Measures should be a step towards that of Coinage (qu. 600).

Professor De Morgan would adopt a Decimal Coinage first, leaving the other (Decimal Weights and Measures) for a future period (qu. 765).

Mr. Airy thinks that the adoption of a Decimal system of Weights and Measures desirable to some extent, and probably concurrent with the Binary system (qu. 481).

What is the correct view on those points? Is the adoption of a Decimal system of Weights and Measures essential to the efficiency and usefulness of a Decimal Coinage? Ought it to precede, to accompany, or to follow, as a necessary consequence, the introduction of Decimal Coinage?

28. Is it not the fact that, next to addition, the most important operation performed on numbers representing broken sums of money is the finding the price of a broken quantity of material when the price of a given unit of the material is a given broken sum?

Is not this operation in theory the multiplication of a broken quantity of material by a broken sum of money? Is it not usually performed, and with great facility, by the rule denominated "Practice"?

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Is it not the fact that one of the great advantages of a completely Decimal system of Money, Weights and Measures, would be that such operations would be performed by simple Multiplication?

Is it not the fact that this result would not be attained unless weights and measures were decimalised as well as money?

If money alone were decimalised, would not such operations be still performed by "Practice," and would the operations be much or at all simplified?

Take, for example, the following case, given by Sir Charles Pasley in his evidence before the Committee of the House of Commons, as showing the advantage of the Decimal system.

215 tons, 17 cwt., 3 qrs., 9 lbs., at £9 11*s.* 6¼*d.* a ton?

Under the present system we should say—

215 tons, 17 cwt., 3 qrs., 9 lbs.,

		£	*s.*	*d.*	
at £1 per ton	=	215	17	10	— $\frac{1}{2^{8}}$
at £8 „	=	1,727	2	8	— $\frac{8}{2^{8}}$
at 10*s.* = $\frac{1}{2}$	=	107	18	11	— $\frac{1}{5^{6}}$
1*s.* = $\frac{1}{10}$	=	10	15	10	$\frac{7}{10}$
6*d.* = $\frac{1}{2}$	=	5	7	11	$\frac{3}{10}$
¼*d.* = $\frac{1}{24}$	=	0	4	6	
at £9 11*s.* 6¼*d.*	=	£2,067	7	8½	

If weights and measures as well as coins were decimalised, the question might be:—Required, the price of 483,597 lbs. at £4·275 per 1,000 lbs., which would be a question of simple Multiplication.

But if only coins were decimalised, then in the pound and mil system we should have 215 tons, 17 cwt., 3 qrs., 9 lbs., at £9·576 per ton, which we should probably work in the following manner:—

100 tons			=	957·600
100 „			=	957·600
10 „			=	95·760
5 „	=	$\frac{1}{2}$	=	47·880
10 cwt.	=	$\frac{1}{10}$	=	4·788
5 „	=	$\frac{1}{2}$	=	2·394
1 „	=	$\frac{1}{10}$	=	·478·8
1 „	=	1	=	·478·8
2 qrs.	=	$\frac{1}{2}$	=	·239·4
1 „	=	$\frac{1}{2}$	=	·119·7
7 lbs.	=	$\frac{1}{4}$	=	·029·925
1 „	=	$\frac{1}{7}$	=	·004·275
1 „	=	$\frac{1}{7}$	=	·004·275
215 tons, 17 cwt., 3 qrs., 9 lbs.			=	£2067·377

Is much or anything gained in this case *unless weights and measures as well as coins* are decimalised?

29. Will not the introduction of a Decimal system of Coins and Accounts necessarily tend to render the present system of Weights and Measures very inconvenient, and thus to force the country into the application of the Decimal principle to Weights and Measures for the sake of necessary correspondence with the Coinage?

"The concurrent use of non-decimal division of commodities with a Decimal "Coinage tends, in reckoning prices, to a result expressed in a binary fraction "of a cent. In such cases, if payment be made, three fourths of a cent is "liquidated with a cent; a half-cent is sometimes paid the same way, some-"times not noticed. The quarter cent is not liquidated. In accounts the "three quarters, halves, and fourths of a cent are generally entered, and added "in on footing the columns, the total being carried to the cents, a fraction above "half a cent being counted as a cent. It is believed that no sensible loss to "either party arises in the long run from this practice. Even in a complete "Decimal system of weights, measures, and coins it would be impossible to "liquidate accurately all reckonings, unless the least coin were smaller than "the public would endure."—Answer to No. 36 of Circular Queries, by J. Ross Snowden, Director of the Mint of the United States.

30. A great practical authority, Mr. Slater, has stated that one consequence of the introduction of Decimal Coinage will be, that articles will be made up in parcels of ten each, instead of dozens as at present. Will not this be less convenient for subdivision than the present practice of making up articles in dozens?

31. Does not the anticipation of the change in this respect afford a practical illustration of the tendency of a Decimal Coinage to force the country into the adoption of Decimal Weights and Measures?

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32. Is not this an inversion of the natural and proper course? Ought not the country to decide in the first instance what system is most properly applicable to Weights and Measures, and then proceed to adjust Coinage and Accounts to that system, Coins and Accounts being the means for adjusting and registering the Retail payments which arise out of transactions which have had their origin in Weights and Measures?

33. The Select Committee of Parliament of 1821 recommended that the subdivision of Weights and Measures employed in this country be retained, as being far better adapted to common practical purposes than the Decimal scale. If this recommendation be founded on sound reason, is it not equally applicable to the case of Coinage as it is to Weights and Measures? Is it not fully as true of Coins as it is of Weights and Measures, that the present subdivision of them is well adapted to all common practical purposes?

See Evidence of J. E. Gray, Esq. (qu. 378.)

Dr. Peacock, speaking of the introduction of the French Metrical System, says, Encycl. Metrop. Art. Arithmetic, p. 448.—"The decimal subdivision of these "measures possessed many advantages on the score of uniformity, and was calcu- "lated to simplify in a very extraordinary degree the Arithmetic of concrete "quantities. It was attended, however, by the sacrifice of all the practical "advantages which attend subdivisions by a scale admitting of more than one "bisection, which was the case with those previously in use, and it may well be "doubted whether the loss in this respect was not more than a compensation for "every other gain." Must we admit the weight of this authority and the conclusion to which it leads?

IV.

34. Is it not the fact that in all matters of abstract number and multiplication of material things there appears to be a general instinctive tendency to adopt the Decimal system, whilst in dealing with material subdivision, whether in length, capacity, or weight, there is an equally strong tendency to adopt the Binary system,—the Decimal system in arithmetical calculation, the Binary system in weights and measures, and the retail transactions of the market arising out of them? Are not all the integers of our Weights and Measures multiplied decimally, but divided by the Binary scale? Do we not speak of ten yards, a hundred yards, a thousand yards? But when we come to *subdivide* the yard, do we not think and speak of half a yard, quarter of a yard, &c., and similarly in all other cases?

"The earliest and most venerable of historical records extant, in perfect coincidence "with speculative theory, prove that decimal arithmetic, as founded in nature, "is peculiarly applicable to the standard *units* of weights and measures, but "not to their subdivisions or fractional parts, nor to the objects of admea- "surement or weights."—QUINCY ADAMS'S *Report to Senate of United States*, 1821, p. 16.

35. Is it not then natural and convenient that our Integer of money, the £ sterling, should be similarly treated? That whilst we speak of ten pounds, one hundred pounds, one thousand pounds, we should *subdivide* the £ sterling into half a pound, or 10*s.*; a quarter of a £, or 5*s.*? And again, that we should subdivide a shilling into half a shilling, or 6*d.*; a quarter of a shilling, or 3*d.*, and so on?—thus applying Decimal Arithmetic to the standard unit of our Coinage, the £ sterling, but not to its subdivisions or fractional parts.

36. In the Report of the Legislative Assembly of Canada on Decimal Currency (p. 14) is the following statement:—

"The Decimal Currency admits of but one aliquot division—into halves; but the "New York shilling, an eighth of a dollar, can be divided into sixths, quarters, "thirds, halves, &c., and although Congress has never coined any shillings, the "American people during sixty years have clung to their well-worn shillings "and sixpences, perceiving them to be a great public convenience. Your Com- "mittee are of opinion that Coins representing the eighth and sixteenth of a "dollar are indispensable in small transactions in Canada, and that the smooth "British sixpences will continue to pass extensively as the eighth of a dollar "unless a better Coinage is provided."

In a communication from the Rev. Joshua Leavitt of New York (p. 48 of the same Report), this further remark occurs:—

"I have no doubt of the superiority of the Decimal system for the purposes of accounts, "and am astonished that other countries have so long delayed its adoption. Our "experience of the benefit of our federal currency in this respect is all one way. "The saving of time and labour is prodigious, and the advantage in point of "correctness and of the facility of detecting errors unquestionable. But for the "purposes of small circulation, in marketing, huckstering, and the like, I am "persuaded that a Duodecimal Currency like that of England, or like that which

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" formerly prevailed in the city of New York, is far preferable. These small " transactions of daily life outnumber the transactions of commerce almost infi- " nitely. And it seems impossible to make a Decimal Currency as convenient " in these as the old currency. One reason is, that the Decimal Currency admits " of only one aliquot division, that is, into halves. The shilling can be divided " into halves, quarters, thirds, sixths, and twelfths; and if it were needed, a " coin of the value of two thirds of a shilling would be found manageable. In " all these countless small transactions which I have referred to, and in which " every man is employed many times every day, this capability of subdivision is " of great convenience. We are constantly buying a half of a thing, or a quarter, " the eighth, the one third, and so on. If the price is a dollar, we can make " the change for one half, for one quarter, and if one, two, or more pence, with " our Decimal Currency; but we cannot pay the exact price of one third, one " sixth, one eighth, one twelfth, or any other of the fractional parts. If the price " is half a dollar, we can only pay for one half, one fifth, and one tenth. If the " price is a quarter of a dollar, we can pay for no aliquot division whatever. " This is a constant inconvenience, and can be got along with in no other way " than by *disregarding small differences*."

If a Decimal Coinage be introduced into this country, is there any reason to suppose that the inconveniences here stated as the result of practical experience in the United States will not equally occur in this country?

Will it be possible to obtain the eighth or the sixteenth of a florin, or the quarter of a shilling, or the half of a sixpence, under the proposed Decimal System?

If the *small differences*, necessarily arising from this imperfect divisibility of the Decimal Coins, must be *disregarded*, upon whom will the unavoidable loss fall?

With the tradesman will it not be an accumulating loss, consuming his profits; and will it not be impossible therefore for him to bear it?

Must it not therefore necessarily fall upon the small purchaser?

The principle of the objection is, that the Decimal system substitutes the divisors 2 and 5 for the divisors 2, 3, 4, 8, 12, 16, which are the natural divisors for material things, and are also the divisors of our present money, giving us the third, fourth, and half parts of every thing.

That the effect of this will be, in the sale of broken parcels of commodities, a small money remainder involving loss to shopkeeper or customer.

This, we see, is a source of constant inconvenience in the United States.

Let us take the descending steps from 8*s*.

8*s*., or 400 mils, or 4 florins, is not divisible by 32, the divisor of $\frac{1}{2}$ oz.

4*s*., or 200 mils, or 2 florins, is not divisible by 16, the divisor of 1 oz.

2*s*., or 100 mils, or 1 florin, is not divisible by 8, the divisor of 2 oz.

1*s*., or 50 mils, or $\frac{1}{2}$-florin, is not divisible by 4, the divisor of $\frac{1}{4}$ lb.

6*d*., or 25 mils, is not divisible by 2, the divisor of $\frac{1}{2}$ lb.

In each of these cases, in the purchase of a broken quantity of material, $\frac{1}{2}$ oz., 1 oz., $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., will there not necessarily arise a broken sum of money, which cannot be paid in any Coin; a small "difference which must be disregarded," to the loss of buyer or seller?

Mark how under a Decimal Coinage the difficulty occurs in an earlier stage, and in a more serious form, than under the present Coinage, precisely as we descend to the lower amounts, to those which are the usual prevalent prices with the middle and lower classes.

If it be assumed that, instead of these prices, "competition will determine prices in " decimals conveniently divisible by 2, 4, 8, or 16," and therefore in prices not corresponding to the Decimal money of Account; if instead of one shilling, or 50 mils, the price of the unit of the material is taken at 48 mils, is not this in itself an admission that in introducing Decimal money we shall have introduced a money not conveniently adapted to the purposes of the market?

And in so doing shall we not have incurred a new set of objections, namely, the inconvenience of being obliged to use several Coins with which to pay the 48 mils, instead of one Coin with which 50 mils may be paid?

37. Again: Mr. Leavitt bears testimony to the admirable qualities of the Decimal Currency for accounts, but asserts that for small circulation and payments in marketing, huckstering, and the like, a Duodecimal Coinage is also wanted and preferable to the other. These small transactions of daily life far out-number the dealings of commerce. And this statement is sanctioned by the concurrence of the Committee of the Legislative Assembly of Canada.

Does not this statement distinctly point to the necessity of not abandoning a Duodecimal System of Coinage, but of introducing, if possible, in connection with our present system of Coins, some means by which money transactions may be recorded in a Decimal System of Notation, thus retaining the present system of Coins undisturbed, but combining with it a Decimal System of Reckoning or Account keeping?

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"Perhaps it may be found by more protracted and multiplied experience that the "same material instruments shall be divisible decimally for calculations and "accounts; but in any other manner suited to convenience in the shops and "markets; that their appropriate legal denominations shall be used for computa- "tions, and the trivial (or customary) names for actual weight and mensuration." —QUINCY ADAMS'S *Report*, p. 90.

38. Are not the following the primary requirements of a good system of Coinage? viz.:—
1st. That the Integer should be divisible into the greatest number of clean fractional parts to correspond with the endless variety of retail transactions which they are to be the means of adjusting:
2nd. That these fractional parts should be expressible in the shortest and most simple form of words, and with the smallest number of figures:
3rd. That the Coins should be such, both in denomination and relative value, as may pass with the greatest facility in valuing or summing them up when presented in great numbers:
4th. That they should be such as may afford the greatest facility for mental conception, for recollection, and for the ordinary processes of arithmetic which the people are daily called upon to perform mentally in the tumult of the market or shop, and without the opportunity of recording them in writing:
5th. That they should harmonize with the natural tendency of mankind to subdivide commodities for retail purposes by continual halving.

39. Is not the following a just description of the present system?
In the ultimate subdivision, where the binary division is alone useful, we have two binary steps, viz., two farthings=1 halfpenny, two halfpence =1 penny. In rising to the next unit, the shilling, we have again the factor 2 introduced twice, giving four 2*s.* besides the number which, next to 2, is most frequently required as a divisor, viz., 3. In rising to the next unit, the £1, we have again the factor 2 introduced twice, giving six 2*s.* besides the prime number which, next to 2 and 3 and their products, is most frequently required as a divisor, viz., 5.

Thus giving the following table of the factors of the number of each of our present units contained in the superior units:—

Farthing.	2 × 2	2 × 2 × 2 × 2 × 3	2 × 2 × 2 × 2 × 3 × 2 × 2 × 5
	Penny.	2 × 2 × 3	2 × 2 × 3 × 2 × 2 × 5
		Shilling	2 × 2 × 5
			Pound

Does not this system fulfil to a greater degree than any other possible system some of the above requirements? Can this system be justly considered as accidental or unscientific?

There must have been some valid reason for the adoption and long retention of our present peculiar system of Coins instead of the obvious plan of making the progression of Coins correspond to the progression of figures according to our Arabic notation.

What is that reason? Is it to be found in the above explanation, and in the varied and infinite divisibility of the Integer obtained through this system?

40. Does it not necessarily follow that a System of Coinage based upon a Binary or Duodecimal scale must answer these requirements more completely than a Decimal Coinage, seeing that 12 is divisible by more factors than 10, and that the quotients of such division are again more divisible under the present than under a Decimal system? And does not our present Coinage afford *peculiar* facilities for continued division into clean fractional parts?

41. If in place of our present division of the £ sterling, a Decimal division be substituted, shall we not in many cases lose the power of obtaining an exact result?
What is the 3rd, the 6th, the 12th, or the 16th part of a £ sterling under decimal division of the Coinage?
Under our present system it is exactly 6*s.* 8*d.*, 3*s.* 4*d.*, 1*s.* 8*d.*, 1*s.* 3*d.*
Again, what is the 3rd, 6th, 12th, and 16th part of a shilling in decimal coinage?
Under our present system it is exactly 4*d.*, 2*d.*, 1*d.*, 3 farthings.

V.

42. If it be admitted that for all ordinary retail transactions, for the purposes generally of paying and receiving, our present Coinage is satisfactory, whilst the inconvenience is found to arise when we come to processes of Account-keeping and Calculation,

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does it not follow that our present Coins ought if possible to be retained without any change, that some Decimal system of *recording* the various sums should be introduced, and that we should decimalize our *Accounts*, retaining our present *Coinage* in all respects unchanged?—See No. 37.

43. How far will this be accomplished by writing down all money values in the number of pence of which they consist, *ex. gr.* :—

£	s.	d.		Pence.		Mils.
1	0	0	=	240	=	1,000
0	6	8	=	80	=	333·333
0	5	0	=	60	=	250
0	3	4	=	40	=	166·666
0	2	6	=	30	=	125
0	1	3	=	15	=	62·5
1	18	9		465		1,937·499

See the following answer to No. 37 of the Circular Queries by J. Ross Snowden, Esq. :—

" *A*. The scope of this inquiry may admit of the suggestion, that if the decimalization " of the British coinage were effected by adopting, in place of the pound sterling, " a new unit of the value of one hundred of the present divisions of the pound (say " 100 farthings, halfpence, or pence) all prices and coins under the present system " would be exactly measured in the new unit and its parts, which would also be " almost exactly commensurable with the dollar of the United States. A unit of " 100 halfpence, for example, which might be called a dollar, would be equal to " $1·013 of the United States, an approximation to our unit so close that the " moneys of the two countries, under such a system, might be deemed substantially " identical."

44. Does not every Decimal System of Accounts necessarily consist in taking the lowest Money Unit, and stating in Arabic notation the cumulative amount of that Coin contained in any given sum.

45. In the £ and mil scheme do we not take the farthing (*changed in its value* and called a mil) as the basis of the system, and then proceed to state all values in the number of these new farthings contained in that value? *

In the penny scheme do we not take, in a similar manner, the penny as the basis but *without any change in its value*?

In addition to this advantage, will not the statement of values by the number of pence contained in them, rather than by the number of farthings or mils, necessarily involve greater conciseness and simplicity of expression, there being only one fourth the number of pence as compared with the number of farthings in any value?

Is it not an advantage in any Decimal System that it does not necessarily involve the introduction of a farthing column into all Accounts, seeing that all sums under a penny are now voluntarily omitted from a sense of convenience in a very large proportion of Accounts?

In those cases in which it is found desirable to introduce fractions of the penny, is there not reason to believe, that it will be found more convenient to express those fractions Binarily than in a Decimal form, seeing that such has been the result of practical experience in the United States?

The Director of the Mint states (qu. 31), "The change has been effectual as to the use " of dollars and cents, but not of the mil, the fraction of a cent being expressed " Binarily."

46. If the Penny be taken as the lowest unit of a Decimal System of Accounts, and if all sums be written down in the number of Pence of which they consist, will not this afford a Decimal System of Accounts which may be used in conjunction with and without involving any disturbance of our existing system of coinage, or changing the character of the £ sterling as the great Unit of Account, as the basis of our system of exchange with all the world, and as the great Integer by which all our principal calculations and estimates of property and of obligations are made?

47. The fractions of a penny would be written as fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. Is this a disadvantage? Is it not the case, that practically in all countries, even in those in which the Decimal System is most completely carried out, the ultimate subdivision of coins is binary? Is not this shown by the fact that in France, Portugal, &c., the 5-centime piece and the 5-rei piece are the lowest coins in general use or generally expressed in accounts? In the United States is not a $\frac{1}{2}$ cent universally expressed instead of 5 mils? What is the inconvenience of writing such values as fractions? Are they not as easily added in this as in a decimal form, and are they not more easily multiplied?

* Keeping accounts in farthings reduced 4 per cent. in value, as stated by Dr. Gray (385).

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48. This system would not include fractions of the Penny otherwise than as fractions. Is it desirable to incur the inconveniences of the £ and mil scheme, the abolition of our present Copper Coinage, the abandonment especially of the penny, &c., for the purpose of comprehending in a Decimal system of Notation and Account-keeping the fractions of a penny, which under the present system are so seldom required, which, when required can be so easily expressed as fractions, and which are in so many cases voluntarily omitted for the sake of convenience?

49. If the Decimal system is to be tried for the sake of simplicity and convenience in Account-keeping and Calculation, is it not the most prudent and safe course to make the trial of it, in the first instance at least, as a system of Account only, without disturbing the Coinage?

How far would this be accomplished by simply authorizing the expression of all sums of money in the number of pence of which they consist?

VI.

50. If the Decimal system of Coinage recommended by the Committee of the House of Commons (£ and mil scheme) be adopted, will it not necessarily involve the introduction of more than two Monies of Account?

Will not this necessarily give rise to difficulty, trouble, and confusion?

51. Is there any country with a Decimal Coinage in which more than two Monies of Account are now in practical use?

52. Is it not important, with a view to the simplicity and facility in calculation which are supposed to constitute the great recommendation of a Decimal system of Coinage, that there be not more than one hundred steps between the highest and lowest monies of account?

53. Is not this the case in all the principal decimal coinages now in use, *ex. gr.*, franc and centime in France, dollar and cent in the United States, &c.?

By an Act of Congress passed in the year 1792, it was ordained that "the money "of account of the United States shall be expressed in dollars or units, dimes "or tenths, cents or hundredths, and mills or thousandths."

Notwithstanding this long-existing state of the law, we are now told, upon the authority of the Director of the Mint, that in that country they "have but two "denominations of Money of Account,—the dollar and cent." And further, we are told "that below the cent they do not usually reckon in mills or decimals, but "in binary fractions of a cent," that is, in vulgar fractions.

What inferences are to be drawn from these facts?

Do they indicate that, be the law what it may, in Decimal Coinage more than two Monies of Account, and more than one hundred steps between the highest and the lowest unit, are found to be practically inconvenient, and, in truth, unworkable.

And further, that the broken parts of a low unit, such as the cent in the United States and the penny in this country, are more conveniently represented by Vulgar Fractions than by Decimal notation.

Upon what other supposition can this established departure in practice from the millesimal division of the dollar distinctly laid down by the law be accounted for?

The annexed statement deserves attention; it appeared in "The Times," April 4:—

"New Orleans, March 19.

"Cotton.—Sales to-day, 3,500 bales, at an advance of $\frac{1}{8}$c., the market closing "firm. New Orleans, middling, 13$\frac{1}{8}$c. to 13$\frac{1}{4}$c.

"Sugar has advanced $\frac{1}{8}$c., and sells for 10$\frac{1}{8}$c., to 10$\frac{1}{4}$c.

"Breadstuffs quiet. Pork firm. Lard advanced $\frac{1}{4}$c.; kegs, 14$\frac{3}{4}$c.

"Freights.—Cotton to Liverpool, 0$\frac{3}{4}$d., and to Havre, $\frac{7}{8}$c."

The broken parts of the cent are all stated in Vulgar Fractions, in opposition to the law already quoted.

These fractions, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{2}{3}$, $\frac{7}{8}$, can none of them be stated accurately in tenths of a cent.

In the case of a rise of $\frac{1}{8}$ cent in cotton, this, stated decimally, must be given as a rise of 1 mill or 2 mills. There is, however, a small difference; the first is too little, the second is too much. What must be the effect of this unavoidable difference, small per lb., when multiplied into the number of lbs. contained in 3,500 bales of cotton? What is the lesson to be derived from these considerations?

54. If with us the £ sterling be retained as the principal Money of Account, does not a subdivision into one thousand parts become unavoidable, with the addition of intermediate Monies of Account between the £ and the mil?

55. Will not this constitute an important difference between the Decimal Coinage of this country and the Decimal Coinages now in use in other countries, much to the disadvantage of our Decimal system as regards simplicity and convenience of calculation, and especially of mental as distinguished from written calculation, which the middle and lower orders are constantly called upon to perform in their daily transactions?

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56. Under our present system is not the high value of our Integer, the £ sterling, a source of great convenience and advantage, especially as compared with the lower value of the franc in France and the dollar in America,—

First, as facilitating the conception in the mind of large values, and expression of them in fewer figures and with fewer words;

Second, as admitting of a greater multiplicity of clean fractional divisions?

57. By the adoption of the Decimal system will not this advantage be converted into a great inconvenience?

Will not our high Integer, by necessitating the intervention of one thousand steps between the top and the bottom of the scale, instead of one hundred steps as in other countries, become the source of confusion and inconvenience, and render the adoption of the Decimal Scale in its most advantageous form impossible with us?

58. And further, will there not necessarily be a less number of clean fractional parts under a system which resolves the £ sterling into one thousand mils, than under the present system, by which it is resolved into 960 farthings, inasmuch as 1,000 admits only of fifteen divisions without a remainder, whilst 960 admits of twenty-seven divisions without a remainder; and the results thus produced are again susceptible of division under the present system, but will not be so under the Decimal system; *ex. gr.*, the eighth part of 960 is 120, which is again divisible by 2, 4, &c. without remainder; but the eighth part of 1,000 is 125, which is not susceptible of further division by 2, 4, &c. without remainder?

59. In Commercial, Trading, and Banking accounts all sums less than a penny are now omitted from considerations of convenience and saving of time in account-keeping. But under a Decimal system, which divides the £ integer into mils, the fourth or mil column must in all cases be retained, as the omission of it would involve the omission of all sums up to $2\frac{2}{5}d.$ The effect of this will be an increase of 10 per cent. in the number of figures used in all such accounts. Will not this increase in the number of figures used in such accounts interfere with the brevity and simplicity of expression, and the saving of time in account-keeping which are anticipated from the Decimal system?

60. The Decimal scheme now under our consideration will retain the shilling and sixpence as fractional Coins, but will it not destroy the peculiar advantage which now attends them, namely, their convenient divisibility? A shilling resolved into 50 mils is divisible only by 2, 5, 10, and 25; but the same shilling, resolved by our present system into 48 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, and 24.

61. Is it not a serious objection to the proposed scheme that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of every thing which they require, and to the use of which they are well accustomed; whilst, on the other hand, it will give them the divisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use?

> "A glance of the eye is sufficient to divide material substances into successive "halves, fourths, eighths, and sixteenths. A slight attention will give thirds, "sixths, and twelfths. But divisions of fifth and tenth parts are among the "most difficult that can be performed without the aid of calculation. Among "all its conveniences the Decimal division has the great disadvantage of being "itself divisible only by the numbers two and five. The duodecimal division, "divisible by two, three, four, and six, would offer so many advantages over it, "that while the French theory was in contemplation, the question was dis-"cussed, whether the reformation of weights and measures should not be extended "to the system of arithmetic itself, and whether the number twelve should "not be substituted for ten as the term of the periodical return to the unit."—
> QUINCY ADAMS'S *Report*, p. 71.

62. The proposed scheme involves an absolute change in the value of all the lower Coins. The penny and all multiples of the penny other than six and twelve will not be interchangeable at equivalent values with the new Decimal Coins; and again, the two lowest monies of account in the Decimal System, cents and mils, will be uninterchangeable at equivalent value with any of the present copper coins, although these latter form parts in odd pence of a large proportion of existing contracts, especially amongst the lower classes, and constitute an immense proportion of the existing Coinage.

From this cause it is anticipated by some persons that confusion and difficulty in their accounts, some unavoidable loss and injustice, and a vague but dangerous impression of more extensive injustice will arise amongst the mass of the people.

Whereas a decimal scheme founded upon the penny or the halfpenny would involve no real change in the value of any of our coins, but would only involve some additional trouble to the richer classes by giving a new numerical form to

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their high integer, the £ sterling, but not involving any absolute change in its value.

Do you think these apprehensions well founded, and what is your opinion of the extent and importance of this difficulty?

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher classes,—those who keep extensive Accounts, and enter into large Calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multiples and subdivisions?

64. In connexion with the foregoing considerations, it has been suggested that a vast majority of the smaller money transactions in a community are not transactions of written account at all; that they arise out of Retail purchases made in the market or the shop, the calculations connected with which are necessarily performed in the head, and are not reduced to writing. That for these purposes, namely, adaptation to the existing division of our Weights and Measures, for distinctness of mental conception and facility of calculation in the head, our existing Coinage is better adapted than a Decimal Coinage; whilst the supposed superiority of a Decimal Coinage for purposes of written accounts and calculations is not applicable to such transactions, and would not prove beneficial to the great mass of the people with whom such transactions are of constant daily occurrence.

How far do these considerations constitute a just ground of objection to the introduction of a Decimal Coinage? or what reply can be made to them?

65. Looking to the considerations alluded to in the preceding questions, the superior facility of division possessed by 12, the further very convenient and almost unlimited facility of division arising from our peculiar mode of reckoning the £ integer into shillings, pence, and farthings; the harmony which exists between our fractional Coins and our Weights and Measures, the doubtful advantages in facility of calculation to be obtained from Decimal Coins unaccompanied by Decimal Weights and Measures, and the brevity and convenience of expression, oral and written, which attaches to our present Coins;—duly weighing, on the other hand, the advantage of assimilating the progression of Coins to that of figures, the simplicity and facility in keeping Accounts and making Calculations, the saving of time in education and of labour by the substitution of simple for the proverbial inconvenience of compound arithmetic, which it is expected will arise from the introduction of Decimal Coinage;—

Is it on the whole prudent to make the experiment? Is the result sufficiently certain? Will the increase of convenience be sufficiently great and fairly diffused over all the classes upon which the inconvenience of the change must fall? Or must we come to the conclusion that the advantage of the change is neither so important nor so well ascertained as to justify the disturbance of our existing system, and of the habits and computations founded upon it?

I submit these questions to the consideration of my colleagues, with great diffidence as regards their incompleteness, and the mistakes which, I doubt not, will be found to be involved in them; but, at the same time, with a full assurance that they are calculated to promote that "further sifting in public opinion" which both the Chancellor of of the Exchequer (Mr. Gladstone) and the President of the Board of Trade (Mr. Cardwell) alluded to in their remarks, quoted in our Preliminary Report, as necessary to "secure a right understanding of the subject by the public "without which it would not be safe for the Government to take any steps in "regard to it."

The advantages of our present system of Coinage, the difficulties necessarily involved in a change, and the objections which may be reasonably urged to each separate system of Decimal Coinage, constitute a branch of the subject which has not perhaps been sufficiently regarded in preceding investigations. Hence these Questions, the object of which is to draw attention to considerations which must be thoroughly sifted and weighed before the subject can be correctly understood by the public, or a decision be safely taken by the Government.

April 1857. OVERSTONE.

ANSWERS TO LORD OVERSTONE'S QUESTIONS.

(*Communicated by Lord Monteagle.*)

G. B. AIRY, Astronomer Royal.

G. B. Airy, Astronomer Royal.

Answer to Question 1. I do.

2. Because the present system is not convenient for calculations, whether the small calculations which are made mentally in the streets or in shops, or the larger calculations which are made on paper.

3. If, in the retail transactions, by "paying or receiving" is meant only "the transfer of coins from one purse to another," all coins are equally convenient. If the words are meant to include "the small calculations which always accompany that transfer," our coins are inconvenient. For instance, in adding mentally or on paper 1*s.* 9*d.* to 2*s.* 7*d.*, when I have added 9*d.* to 7*d.* and form 16*d.*, I have the trouble of converting the 16*d.* into 1*s.* 4*d.*, which trouble I ought not to have in a well-arranged coinage.

In the account-keeping, &c. the objections are still stronger.

4. I consider the primary purpose of coins to be, to afford means of exchanging known quantities of precious metal, of all conceivable magnitudes, for other commodities; and I consider the object to be aimed at (in establishing a relation among different coins) to be, that when the number of petty coins becomes inconveniently great, they may be converted into a few large coins by the easiest process; or when the large coins must be subdivided, the subdivisions may be expressed in petty coins by the easiest process.

The apparent alternative in Question 4 appears to me incomplete.

5. I do not conceive the possibility of the supposed opposition of claims, and am therefore unable to answer.

6. I do not conceive that there can be the opposition which the division of this question seems to imply. So far as retail transactions imply the use of the same coin throughout (as if oranges are bought at one penny each, and 5 pennies are paid for 5 oranges,) all systems are alike. So far as they imply a change of coin (as if 23 oranges were bought and paid for by one shilling and eleven pennies), the retail transactions come under the same category as the account keeping. I think that the distinction which the question insinuates is without foundation.

7. I do.

8. It loses the division by 3, which is of little importance; while it gains that by 5, on which the score depends: and it partially loses the continuation of divisions by 2, which is important, but, in my opinion, greatly inferior in importance to the advantage of decimal multiplication or division throughout (it being always borne in mind that above 1*l.* the multiplication must be decimal).

9. First, I may remark that in the course of my life, to the best of my recollection, I have never had occasion to divide by 3, 6, or 9, and rarely by 12; and in any case the treatment would come under the following sentence, viz.:—

Second, if I have occasion to divide 27*l.* 17*s.* 9*d.* by 4, I am in no degree benefited by the circumstance that 20 and 12 are divisible by 4. I say, 4 goes 6 times in 27 with 3 remainder; I turn the 3 into shilings, and then I say 4 goes 19 times in 77, with 1 remainder; I turn the 1 into pence, and then I say 4 goes 5 times in 21, with 1 remainder; I turn the 1 into farthings, and here (where it is unimportant) I have a divisible number.

The fallacy in the remarks cited consists in the assumption that extreme benefit is derived from certain divisibilities, which practically is not so derived.

10. On the inferiority there is no doubt. On the consequent inconvenience I remark as follows:—

Doubtless when the mind of man is quite free to choose, and when there is to be no combination of multiples and sub-multiples by addition, multiplication, or division, the binary division suits him better than any other. The scales of avoirdupois weight, and of measures of capacity (both which run up to 256) are strong evidence of this. But when the combination by addition, multiplication, or division comes in (as it does in money transactions at every step) the charm is broken.

I attach no importance to the division by 12. I think it has come in only because 8 is rather small and 16 rather large.

11. Napoleon's infantry, cavalry, guns, rations for troops, requisitions in francs for their support, were all expressed on a decimal scale; and he never failed in "distinctness of conception," "facility of recollection," "readiness and ease in mental calculation," or in making "fractional parts" in dividing an army, from that circumstance. So far as I see, the same applies to smaller numbers.

12. The questions here given are put in a form which has no bearing whatever upon the merits of two systems. Divisions are to be made by 2 and 3, and for these is selected a sum which in present coinage is particularly favorable (90*d.*), and in decimal coinage is particularly unfavorable (375 mils.). Instead of this, try round numbers in both, as 8*s.*=400 mils, and either exclude 3 (which, as I have said, is useless), or include 5 as well as 3. The appearance of the result would be very different.

Probably Price's firm would put their candles in 10 lb. boxes if the coinage were decimal.

To the last question but one I would oppose this,—"On the new system 10 mils is paid by one coin; how many coins would be required to pay it on the old system?"

It clearly is not correct to compare two systems when all the amounts to be expressed, &c. are based upon notions taken from only one of them.

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13. I do not certainly understand the purport of the question. Possibly what I have said under No. 4 may have a bearing on it.

14. There are in this question, as it appears to me, two fundamental misconceptions in the way of putting it, which totally invalidate the implied conclusion.

The first is that, in estimating the labour of addition by the number of figures, the mental effort of converting a sum of pence into shillings and pence is totally put out of sight, and this is the very step in which blunders most frequently occur.

The second is, that round sums are taken in the first and third columns (excluding farthings) while the mils are driven to the last integer.

I would propose either that round sums be taken in mils, or that both systems be taken to the last coin (farthings and mils). The mils would have the advantage in every particular.

15. The divisions on which so much stress is laid are, I believe, never wanted. I refer to my note on No. 9.

In the comparison at the end, eleven of the figures counted up among the mils are cyphers, presenting no labour of the mind whatever.

The comparison by mere number of figures (see beginning of my note on No. 14) is not sufficient.

16. I think it is desirable without such reference.

17. Certainly the adjustment of coinage can be properly disconnected from the adjustment of weights and measures, as will be seen on trying any case. If an avoirdupois pound of any commodity costs 4*l.* 17*s.* 10*d.*, what will an avoirdupois ounce cost? Now, without waiting for any change of the avoirdupois scale, all that I want to know is, how I can most easily divide 4*l.* 17*s.* 10*d.* by 16? And I assert, as a thing which nobody can doubt who tries, that this is much the easier on the decimal scale of money; and therefore the introduction of the decimal scale of money is advantageous, without modification of weights and measures.

18. Fully included in the answer to 17.

19. Fully included in the answer to 17.

20. At 1*s.* per pound the statement is correct; at 1*s.* 5$\frac{1}{2}$*d.* it is not correct.

21. The same remark.

22. Yes, in all the five points mentioned.

23. In regard to the first part of this, I refer (as before) to the considerations in my answer to No. 9, with due extension.

In regard to the notion that the working classes would be the sufferers, I am surprised. The transactions of tradesmen with the working classes are as completely subject to the rules of competition as those with the highest men of business, and far more so than with men of fashion. This competition renders such oppression as Mr. Yates fears totally impossible.

24. Certainly it is as regards commodities; but as regards monies I again refer to No. 9.

I believe that the unit of America is unfavorable to Decimal Coinage, the cent being too large to end with, and the mil too small. Binary division of the cent is almost necessary, and this helps to introduce it in every part of the scale.

25. If this had been the sole consideration I would have divided a shilling not into 12 but into 16 parts; but there are things much more important to be considered.

26. I refer to my answer to No. 17.

27. I refer to my answer to No. 17.

28. In the instance adduced the advantage at first sight is with the old system; but upon closer examination I believe it will be found that it is not so; for, first, in the division of the sums of the old system there is the constant mental change of one coin carried forward into another coin (thus in the $\frac{1}{10}$th there is 8*s.* to be changed into 96*d.*), which is a severe and dangerous addition to the labour.

Secondly, the lower operation is not given in the most advantageous form; the 200 tons should occupy one line, the 2 cwt. should occupy one line; 8 lbs. should occupy one line.

Thirdly, in the addition, the lower is much the easier and safer.

29. As regards the question I think not.

As regards the citation, I refer to my note to No. 24.

30. Generally speaking parcels of 10 would be less convenient than parcels of 12, and therefore I do not expect them to come into use very much.

31. No.

32. The natural and proper course, it appears to me, is to begin the change where it is easiest to begin, and where the convenience will be immediately felt. It is easy to change the coinage, and the change would be convenient immediately; it is almost impossible to change weights and measures, and the change would be inconvenient.

33. The advantage of the existing subdivisions of weights and measures in this country is great, so long as, when mixed denominations are used, they are not subject to the processes of long addition, multiplication, or division. When these come in, the existing subdivisions are excessively inconvenient, and all who use them have been compelled to abandon them and resort to the decimal scale. Thus—

The Civil Engineers, one and all, have long since abandoned the use of inches on the levelling staves, and have adopted decimal parts of the foot.

The Bank of England, the Royal Mint, and bullion dealers generally, have abandoned the pennyweight and grain, and have adopted decimal parts of the Troy ounce.

Her Majesty's officers of Customs have abandoned the avoirdupois ounce and dram, and have adopted decimal parts of the avoirdupois pound.

Coins require the decimal division even more imperatively, because they are more frequently treated in long addition, multiplication, and division.

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34. I most fully agree with this, as applied to measures, &c., not combined by long additions, &c. See the last note.

35. See note to 33, which fully answers this.

36. The American experience tells little, for this reason: they had the dollars, and they had the shillings and sixpences, and they easily established a not inconvenient relation between them; and then naturally they disliked the trouble of change. To this is to be added (as I have before said, note on 24,) that the dollar is a bad coin for continued decimal subdivision.

I give no attention to the one third or two thirds.

If the divisions by such numbers as 16 were to be strictly carried out, the existing coinage would frequently be more convenient than the Decimal Coinage. I imagine that the divisions are not strictly carried out, and that in general a small packet of goods is sold dearer than a large one; and that the Decimal Coinage would not be inconvenient for this system.

37. If it were possible, I should be glad to have two concurrent systems of subdivision of the florin (like the binary and decimal subdivision of the avoirdupois pound, &c., mentioned in my note to 33), but I do not think it is possible; and in this war of extermination the question is, which system shall be established, to the absolute exclusion of the other? I prefer to establish the Decimal System.

38. These are some of the primary requirements, but not all. Add to them,—

6th. That sums expressed by several denominations of money shall be easily added in long columns;

7th. That such sums shall be easily multiplied;

8th. That such sums shall be easily divided;

39. The statement is correct; but as to the notion that there must have been "some valid reason," let me oppose another statement. To the year 1834, I think, accounts were kept at the Exchequer by means of wooden tallies. There must have been "some valid reason." What is that reason? I believe the reason to have been the same in both; that in earlier ages people did not write so generally as to feel the pressing want of the change, and that in later ages the matter has depended immediately on the Ministers of the Crown, whose tenure of office is uncertain, who are overworked in politics, and who are desirous to tide over any avoidable change.

40, 41. Not so very important. See my note on No. 9.

42, 43. Impossible, in my opinion. While the sovereign exists, and while people exist with their old habit of entering the sovereign as the unit in their books, they will continue to do so. This is because the sovereign is regarded by everybody as the fundamental unit of British money. There would be some difficulty, but I apprehend infinitely less, in inducing people not to enter the shilling. Indeed, I consider this as the only difficulty in decimal scale; but I have no fear of quickly overcoming it.

44. Yes. I do not see the import.

45. The change of the farthing is unimportant. The poorest creature in the streets refers everything to a larger coin, and these are not changed.

All evidence and all experience show that coins down to something like a farthing cannot be neglected, even in tradesmen's bills.

The fraction of an American cent is too small for decimals. See note on No. 24. The instance proves nothing.

46. As I have said, Nos. 42 and 43, I do not think this possible.

47. The Portuguese subdivisions are liable to the same remark as the American, the thousandth part of a dollar is too small: and the hundredth part of a franc is too small. The English coinage is adapted with peculiar felicity to a Decimal System.

48. I think that the farthing or mil is required as a member in the same Decimal System as the rest; and that the present copper coinage might be well retained, the halfpenny and light penny becoming two and four mils, and the heavy penny becoming five mils, till new coins should be provided.

49. I do not think it possible. Nobody would use the permission.

50. Sometimes people would say "so many florins," just as we now say "thirty shillings;" and "so many mils," as we say "so many pence." No more difficulty, trouble, or confusion, than at present.

51. I know not; nor do I think it important.

52. I do not see that it is.

53. I do not draw the same inference. I only remark that their fundamental unit is much smaller than ours.

I have referred repeatedly (see No. 24) to the unfitness of the American cent for further decimalization.

54. Yes; the monies of account to the same number as at present.

55. No disadvantage that I perceive.

56. The first question is doubtful; I think unimportant.

The second has been abundantly treated above.

57. I do not see the least reason for assenting to these two conclusions.

58. Certainly; but this has been abundantly discussed above.

59. In the present system there are two columns for shillings and one for pence, three in all, and great trouble in passing from one to the other. In the Decimal System there are also three columns (of which one would be a little more troublesome than the first column of shillings), no trouble in passing from one to the other, and four times the accuracy.

60. It will, in some measure.

61. Omit the 3, and I assent to this.

62. I do not think the apprehensions well founded. Everybody regards the copper coin merely as change for silver.

I think it is unnecessary to compare it with the decimal penny scale, which I regard as totally impossible.

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63. The advantage would be experienced by all who buy multiples at a shop, that is, by everybody.

I think the assumption in the last clause is quite unfounded. I do not believe that there is any class to whom the penny and its divisions are important, except as change for silver.

64. I believe that the decimal scale is the superior for these calculations. See an instance, in my evidence before Committee of House of Commons, relating to the price of gas.

G. B. AIRY.

April 17, 1857.

OBSERVATIONS ON SOME OF LORD OVERSTONE'S QUESTIONS.

(*Communicated by Lord Overstone.*)

GEO. ARBUTHNOT, Esq.

Geo. Arbuthnot, Esq.

Answers to Questions 4, 5, *and* 6. The primary use of coins is to make payments, and there can be no doubt that a system of coinage would be imperfect which does not give facility for settling retail transactions.

It is not essential that current coins should correspond in all repects with the money of account; but it is at least convenient that the principal coin should represent or coincide with the integer of the money of account, and that the subordinate coins should represent or be readily convertible into the fractional denominations of the same money.

Our present monetary system meets every requirement in respect of suitableness for retail transactions and harmony between the coinage and money of account. I conceive that the questions for consideration are, whether the Decimal System could be substituted for the subsisting one without material loss of these advantages, and whether it offers in itself such marked advantages as to render it desirable to incur the risk of change.

1 *and* 7. I should be disposed on these considerations to answer the first and seventh questions in the negative. At the same time I do not think that the inferences to which many of the succeeding questions lead are fully borne out.

8, 9, 10, *and* 11. There can be no doubt of the facility which the duodecimal scale affords, from its greater power of subdivision, for retail dealings; and it may not be unworthy of remark that it has been adhered to throughout all the changes of our coinage since the time of the Conquest. The first gold coin which obtained general currency, namely, the noble, represented the multiple of a penny, its value being 6*s.* 8*d.* It was followed by the mark, value 13*s.* 4*d.*

The pound sterling, the integer of our money of account, did not obtain a permanent representative in the coinage until its settlement in 1816. The fixed habits of centuries ought not to be disregarded, more especially when they are obviously founded on considerations of popular convenience. Yet I think that it cannot be held that a Decimal System "must be less favourable to "distinctness of conception, to facility of recollection, and to readiness and ease in mental calcula- "tion, than our present system." (I omit the word "binary," because a strictly binary system of coinage does not exist.) In small retail transactions the opportunity of computation by aliquot parts affords great facility; but when large sums are involved I conceive that a decimal scale could be worked mentally with greater ease, either in multiplication, addition, subtraction, or general computation.

12. The illustrations in the twelfth question overlook the aid which coins afford, as material signs of value in mental calculations. The proportion which they bear to each other is borne in mind by those who use them, and in common dealings they supersede figures. There is even a tendency to make prices conform to the principal current coins. Thus when the guinea was the gold coin in use, fees and high-priced commodities were usually reckoned by guineas and half guineas in preference to the pound, notwithstanding that, from the odd numbers of shillings contained in them, they afforded less facility for binary division than the money of account, and that the expression of their multiples in accounts required a computation in each case. Eighteenpenny tokens formerly occupied a similar position in small transactions. If a Decimal System were established, the coins adapted to it would become the common signs and measure of value. People would not generally speak of 375 mils, but of 3 florins and 75 cents, or perhaps 1½ shilling. The old names would generally be retained in the case of equivalent coins, and popular names would be given to new ones, if the decimal nomenclature should be found inconvenient.

Section III. I am inclined to think that a Decimal Coinage would not work satisfactorily with our existing system of weights and measures, and that it is to these that the principle, if it be adopted, should be applied in the first instance.

(*Section IV.*) It is, however, to be observed that the defect which attaches to a Decimal System from the want of facility for binary division may be materially diminished, or even removed altogether, by the adoption of an integer of small value, or by the addition to a larger one of an increased number of decimal places. The advantage afforded by the Decimal System is that computations are carried on without break from a low figure, and the place at which the decimal point should be introduced is in fact arbitrary.

In the examples afforded in question 36, the inconveniences experienced in the United States are referred to, and it is asked, whether, if a decimal coinage be introduced into this country, the same inconvenience will not equally occur? By the term "a Decimal Coinage," it seems to be assumed that the Mil System would be adopted without modification. Now, of all the systems of Decimal Coinage which have hitherto been established, that of the United States affords the strongest example of the practical inconvenience pointed out. The cent, which is the lowest denomination in the coinage of that country, is nearly equivalent to our halfpenny: the dollar being the unit, the power of binary division stops at a quarter of that coin, or 25 cents, equivalent to 1*s.* 0½*d.* We do not find that the inconvenience referred to exists to the same extent in France

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where the franc being the unit, the cent of that coin represents one fifth of a sous piece, and binary division of the unit may be carried down to 5 sous. Still less does it exist in Portugal, where the decimal subdivision of the unit, the milrei, equivalent to a dollar, is carried down to three decimal places, the rei being equivalent to one-fifth of our farthing.

But although the particular inconvenience referred to may be avoided by the adoption of a low decimal scale, it may be objected that inconvenience of another character would arise from the great addition to the number of figures in accounts.

A Decimal Coinage, with the pound sterling for the unit, subdivided into mils, would occupy an intermediate position, in respect to the value of the lowest denomination, between the systems of the United States and of France. Binary division of the pound would be carried down to 25 mils, equivalent to 6*d.* Without, however, interfering much with the simplicity of the system, the inconvenience which is dwelt upon in Lord Overstone's paper might be greatly mitigated by the recognition of half mils in the coinage. The binary subdivision could then be carried down to $12\frac{1}{2}$ mils, equivalent to 3*d.* of our present money, and the stumbling block of the impossibility of dividing the florin by the divisors of the ounce would be overcome.

G. ARBUTHNOT.

June 3, 1857.

J. J. BENNETT, Esq.

J. J. Bennett, Esq.

It is right that I should state that my qualifications for offering an opinion upon the subject consist solely in an acquaintance with the ordinary transactions of every-day life, a great fondness for reckoning, and a considerable amount of practice in calculations both decimal and mixed.

Answer to Question 1. I am decidedly of opinion that no change in our present system of coins is desirable; and I believe it to be the general opinion, as it is my own, that the florin was a useless addition to the existing coinage.

2. See my answer to Question 1.

3. I consider "our present system of coins" as the most convenient system in existence "for the purposes of retail transactions, *i.e.*, for paying and receiving." In mental calculations it is in my opinion greatly superior to any Decimal System, and infinitely so to the pound and mil scheme. In account-keeping, I believe that the supposed advantages of greater facility in a Decimal System are more than counterbalanced by the greater risk of error attached to it from the wearisome monotony of its operations, and the misplacement of the decimal points by ignorant or careless computers. In calculations of a higher order, decimals are of essential importance, and are already extensively used by the educated men engaged in such calculations, who find no difficulty in the conversion of our present currency into decimals, and the re-conversion of these into pounds, shillings, and pence, whenever this is needed in their calculations.

4. I consider coins (whether they be regarded as fractional subdivisions of an integer or as aggregations of smaller integers) as destined primarily to facilitate payments. It is only in a secondary point of view, and where (as in the case of our present coinage) there is a perfect coincidence between the coins and the system of accounts, that they become of importance in facilitating accounts.

5. From my answers to the preceding questions it will be seen that I consider our present system to be the most desirable both for retail trade and for the keeping of accounts. But even if it were otherwise, and it became necessary to subordinate the one to the other, I cannot hesitate for an instant to regard retail trade as the primary object to the uses of which the currency should be made subservient. The transactions of retail trade are in the proportion of at least a thousand to one to wholesale dealings; they are in the great majority of instances the subject of immediate payment in money; and they constitute the entire sum of the pecuniary dealings of the poorer and less instructed classes, as well as a large share of the dealings of all.

6. I believe the existing coinage to be admirably adapted for "adjusting with readiness and simplicity the multiplied variety of small payments." And I never heard from any person practically engaged in retail trade "any complaint against our present system of coins in this respect." I may add that in the whole circle of my acquantance, so far as I am aware of their opinions on this subject, (and I have taken much pains to ascertain them,) a very small minority indeed, and those, as it appears to me, entirely on theoretical grounds, are at all favourable to any change.

7. I do not recommend, but on the contrary deprecate most strongly, "the introduction of the decimal principle into our coinage."

8—10. The impossibility under the Decimal System of breaking "the integer into as many clear fractional parts as we now obtain under our present system of coins" has always appeared to me an insurmountable objection to its introduction. Its great "inferiority as compared with a coinage founded on a combination of the binary with the duodecimal" and vicesimal scale is so obvious, and the extreme importance of this fractional divisibility in the great mass of the transactions of every-day life is so familiar to all practical men, that on this account alone a Decimal System would be at once rejected by the great bulk of the community as an impolitic, inconvenient, and retrograde measure.

11. There can be no doubt of the correctness of this remark. The form 12*s.* 6*d.*, for example, (and the same may be said of almost every other ordinary element of calculation,) is much more distinct in the conception, facile in the recollection, and capable of ready and easy use in mental calculation, than when represented by 625 mils.

12—15. I agree so entirely with the conclusions which would naturally be drawn from these questions, as here stated, and from the tables and other calculations by which they are illustrated,

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that I consider it quite unnecessary to reply to them in detail. All the advantages in regard to mental calculation (which is from its great comparative frequency by far the most important object) are in favour of our present mixed system. Among these, not the least depends upon the extent of the divisibility of the larger units. In this respect we have some reason to regret even the loss of the guinea, which it was perhaps desirable to withdraw from circulation on account of its incommensurability with the system of accounts, but which was capable of still more numerous subdivision than even the pound, adding, as it did, the divisors 7 and 9, at the expense only of the loss of the division by 5; for which reason, among others, it still continues in nominal use for various purposes.

16. I am decidedly opposed to the introduction of the Decimal Principle either into our coinage or into our system of weights and measures, but I should presume that it must be obvious to the supporters of a Decimal Coinage that its adoption without the concurrent introduction of a Decimal System of Weights and Measures, would necessarily deprive it of nearly all the advantages which they anticipate from it, and add to (instead of diminishing) the existing difficulties of calculation, even upon paper.

17—24. There can be do doubt that in the subdivision of articles for sale which admit of such a mode of division the natural system (or that which is most consonant with the wants and habits of mankind) is binary, consisting of a continual halving or doubling. In this manner the stone of 14 lbs. has originated from three successive halvings of the hundredweight, and the stone of 8 lbs. and gallon of 8 pints have originated from three successive doublings of the pound and pint. In this manner the pound, the pint, and the yard (in the measurement of drapers' goods) are subdivided by continual halvings. This is so directly founded in the nature of things that any system (such as the Decimal) which will not admit of it is obviously unsuited to the requirements of retail trade, and could only serve to embarrass and confound. It scarcely needed the experience of the United States and of France to prove this almost self-evident truth; but the experience of both is so clear and distinct as to admit neither of denial nor of doubt.

25—27. With the highest deference for the opinions of Sir John Herschel, Professor De Morgan, and the Astronomer Royal, on purely mathematical questions, I must confess that on a question entirely practical regarding the most convenient system of coinage, or of weights and measures, I have a much greater confidence in the opinions of practical men, such as the late Lord Ashburton; on such questions I appeal from those who are chiefly conversant with abstruse calculations to those whose avocations make them thoroughly acquainted with the business transactions of every-day life. For these, I consider the Decimal System, whether applied to the coinage or to weights and measures, as peculiarly unfitted. Let me add that astronomers and mathematicians themselves practically confess that there are subjects for which a decimal mode of division is not desirable, inasmuch as they steadily hold fast by the mixed and duodecimal systems which have prevailed from all antiquity in regard to the division of the circle by 360 degrees and by 24 hours. Before they insist so pertinaciously on compelling others to abandon a mixed system for a decimal, they should in common decency set the example by adopting an exclusively Decimal System in their own proper pursuits.

28. The increased amount of calculation required for the solution of this question, propounded by a warm supporter of the pound and mil Decimal System, affords a striking illustration of the increased labour which would result from the introduction of that system, even in regard to calculations upon paper, to which I have adverted in my answer to Question 16.

30. On this point I regret to differ from so great a practical authority as Mr. Slater, but the facility of subdivision being the principle upon which articles are now sold in dozens, and the practice being thus founded in the nature of things, I feel convinced that they would still continue to be sold in dozens, notwithstanding the difficulties in calculation to which a decimal division of the coinage would give rise; and the examples both of the United States and of France confirm by long experience the soundness of this conclusion.

33. Most of the great mathematicians, past and present, have concurred in regarding the duodecimal scale of notation as more perfect than the decimal, and the practice of all ages proves that a combination of the two has always been considered as the most useful for the common purposes of life. This combination we possess in a very perfect form in our system of coinage and accounts, and in our measures of length. The division of the circle into 360 degrees, of each degree into 60 minutes, of each minute into 60 seconds, and so forth, affords another striking instance of the advantages of this combination, which no other scheme that has been propounded has ever had the smallest chance of superseding. The successive divisions by $360 \div 60 \div 60$, &c., and by $24 \div 60 \div 60$, &c., seem at first sight very embarrassing, but they are found in the highest and most abstruse calculations to answer their purpose better than any others that could be devised. The relations of space do not afford us any easy and natural means of comparing one unit with another; but the relations of time (as regards the earth, the sun, round which it revolves, and the moon its satellite) furnish a near approximation to a natural division, which begins with the duodecimal and is continued through a mixed system of decimal and duodecimal. Thus the year is naturally divided into twelve months, and the months into an average of about 30 days; and the practice of all ages has further concurred in dividing the day into 24 hours, the hours into 60 minutes, and so forth. These divisions, founded on nature, and fixed by practice, have an important bearing upon the question of deserting a mixed decimal and duodecimal system of coinage for one purely decimal, inasmuch as they enter as essential elements into a great variety of monetary transactions. No proposal for decimalizing the divisions of the year or the hours of the day, and such have frequently been made, has ever met with the slightest acceptation; nor is it likely that such a change will be made while nature, custom, and convenience are allowed to outweigh the prestige of a merely theoretical uniformity.

34—41. My concurrence in the inferences which appear to me to be inevitable from the premises contained in these questions has been already so strongly stated, that on many of the points contained in them I consider it unnecessary to do more than refer to my former answers. "In all matters of abstract number and multiplication of material things," we are compelled to employ

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the notation in common use, which is the decimal; "whilst in dealing with material subdivision in weights and measures, and the retail transactions arising out of them" the binary system is by far the most convenient and influential, and has consequently become the prevalent mode of division. The necessity of providing for thirds and sixths in many of the most ordinary transactions of life renders the duodecimal division the next in order of importance; while the rarity of those occasions on which a division by 5 becomes necessary, combined with the impossibility of subjecting the number 10 to a second halving, or to subdivision by any other number, detracts so much from the value of the decimal mode of division as to make it the least convenient of all. In our existing system of coinage we have the means of applying all these different modes of subdivision in the most complete and perfect manner. The argument in favour of adopting the purely decimal system to the exclusion of all others appears to be founded solely upon its coincidence with the system of notation in common use; whence it is inferred that with a Decimal System of coinage all monetary calculations would be made with greater facility and accuracy than under the present mixed system. Now if this be true at all it is true of the Decimal System in the abstract, and consequently equally true of every decimal system that has been propounded. But what faith have the Decimalists themselves in this proposition, which lies at the very root of their argument? Are the supporters of any of the numerous decimal schemes that have been suggested ready and willing, if unable to obtain that which they themselves propose, to accept any other decimal scheme in its place (no matter which) rather than retain the existing system? Or, rather, do they not one and all proclaim that if they are refused the particular scheme on which they have set their hearts they would rather, much rather, remain as they are? What becomes, then, of the abstract value of the Decimal System even in the estimation of those who use it as a main argument in favour of a change? For myself I altogether deny this supposed abstract superiority of the Decimal System as regards all the ordinary transactions of life. To mental calculations, in the market or over the counter, it is wholly inapplicable. And, even in regard to the great majority of ordinary business calculations made upon paper, I maintain that under an unmixed Decimal System they would be at least as laborious and at least as liable to error as under the present mixed system of accounts. Ask any clerk who has been in the habit of adding up long columns of pounds, shillings, and pence, where his greatest liability to error occurs, and he will tell you that it is in the column of pounds. And it is natural that it should be so. In adding up the columns of shillings and pence the attention is kept alive by the varying values of the different denominations, and errors seldom take place; but in the column of pounds the unvarying succession of units and of tens wearies the attention, and mistakes occur much more frequently from the wearisome uniformity of the mental effort. How much more frequent would these mistakes become if there were no interruption at all to this dreary monotony. In the processes of multiplication and division, too, a new source of error (and that a large one) would arise from the misplacement of the decimal point. Every one who is conversant with decimal calculations knows well how necessary it is to keep the attention constantly alive to this important element, and may readily judge for himself how frequently ignorance or carelessness would mistake its proper position. Of the difficulty of guarding against this source of error, one single instance, supplied by a work connected with the present discussion, may suffice. Among the examples illustrative of the greater accuracy and facility of the Decimal System appended to a clever pamphlet in its favour, there is one in which (by an error in this important particular) the number of pounds sterling contained in a given number of francs is decupled. On the subject of decimal points I will only add, that in many scientific works published in France, Belgium, and Holland, in which the metrical system is employed, and the measurement of objects is given in metres and their decimals, the continual blundering in the placing of the decimal point, together with the false value given to the decimals by a mistake in the number of 0's by which they are preceded, are fertile sources of innumerable errors.* So much for the supposed greater facility and accuracy

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* I see it constantly stated by the advocates of a Decimal System of Coinage that it is quite independent of decimal points, and that consequently no mistakes can possibly occur in relation to them. This assertion is quite beyond my comprehension, when I consider the infinite variety of questions which cannot be correctly worked without a strict attention to that important particular. I quote from a circular issued on the 1st of July 1857, by Mr. William Brown, the Chairman of the Decimal Association, the simple, unmodified statement that "there is no puzzle about the decimal point connected with the system," together with the two following sums (the only ones there given) in illustration of its advantages.

The question to be solved is, "What is the duty upon three butts of currants weighing gross weight, 59 cwt. 1 qr. 16 lbs. = 6,652 lbs., the duty being 15*s.* per cwt., and 5 per cent. added, the tare being 14 [lbs.] per cent. ?" [cwt.]

lbs.
⅛) 6,652

831·5 tare 12½ per cent. = ⅛.

5,820·5 nett.
7 duty 14*s.* per cent. = 7 florins.

40,743·5
20

14,870
12

10,440 duty £40 14*s.* 10*d.*

lbs.
⅛) 6,652
831·5 tare.

5,820·5
7 duty 7 florins per cent.

£40·743 answer

The practised mind, acquainted with decimals, will readily detect the means by which the conclusions are arrived at; but to the unpractised I will venture to say that a greater "puzzle," and that "puzzle about the decimal point," has seldom been presented. No explanation is attempted to be given of the process by which the position of the decimal point is determined.

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of decimals in the abstract. But over and above these objections the pound and mil system proposed for our coinage and accounts is liable to many important objections peculiar to itself, to which I shall recur in my answers to some of the following questions.

42. I do not admit that any inconvenience is felt in the processes of account-keeping and of ordinary calculations under the existing system, which would not be increased, rather than diminished by a Decimal System of recording the amounts; and, therefore, I see no advantage but a positive disadvantage in the introduction of such a system. And I believe that in Portugal for instance, where a Decimal System of recording amounts co-exists with a coinage bearing in some of its denominations a duodecimal relation to the lowest integer, the two concurrent systems, although working harmoniously together, are found to embarrass rather than facilitate the ordinary processes of calculation.

43. The advantage of the penny system over the pound and mil system, is strongly evidenced in the example given; but the penny system shows no superiority to the existing system, the number of figures (rejecting the five unnecessary 0's in the column of £'s) being the same in both, and the process of addition quite as easy in the one as in the other; while there is a positive disadvantage in the necessity of conversion into the lower denomination, and a loss of that distinctness of comprehension which has been before so justly insisted on as one of the characteristics of the present system.

45. I have not the smallest doubt of the great superiority of the penny system over the pound and mil system, for many reasons which are quite conclusive in my mind, but which it is unnecessary for me to state, inasmuch as I object to the introduction of any Decimal System whatever. Of all the Decimal Schemes proposed that which takes the penny for its basis is the only one which I consider possible; but it is liable to all the objections which, in my opinion, render a Decimal System in the abstract (and consequently all Decimal Systems) the most unfitted that can be imagined for the common purposes of life.

49. If the Decimal System were really so simple and convenient in account-keeping and in ordinary calculation as it is represented, would it not long ere this have been generally employed for that purpose? The difficulty of conversion is not great, the process is simple and well known, and every one is at liberty to keep his accounts and make his calculations in Decimals if he thinks fit. But practical men have not thought it worth their while voluntarily to adopt the Decimal System—for what good reason then should they be compelled into it?

50—57. The Decimal System of Coinage recommended by the Committee of the House of Commons and by the Decimal Association, contemplates four monies of account. These are thus stated in a circular signed by Mr. William Brown, the Chairman of the Association, dated July 1st, 1857: "Our money-table would stand thus:—Ten farthings = a cent; ten cents = a florin; ten florins = a pound." In this extract it will be seen that the word mil is abandoned in favour of the farthing; but as the identification with the existing farthing is not correct, that term cannot properly be applied to the system, which must still be called for distinction "the pound and mil scheme." Of these four monies of account one only, the cent, could possibly be dispensed with in practice: to speak of hundreds of mils in the ordinary transactions of trade would be simply to render the language of commerce unintelligible; the florin must consequently be used in common parlance, and thus an intermediate term would be introduced between the integer and its ultimate subdivisions—a thing unknown in practice to any of the Decimal Systems in existence, and highly calculated to embarrass and confuse. Even the lumping together of the two lower denominations, which the experience of all existing Decimal Coinages proves to be a practical necessity, would be attended with the extreme disadvantage of yielding unmanageable sums, the combinations of which could scarcely be borne in the recollection, although they would be continually required in the most ordinary transactions. Every sum exceeding $2\frac{1}{4}d.$ of our present money would be expressed by two places of figures, and every amount exceeding $2s.$ by three. By this means "facility of recollection" would be entirely lost, and all the mental calculations founded upon it must in minds of ordinary capacity be given up. Let us take a single example from the business of a butcher's shop. Here, in nine cases out of ten, the butcher's wife keeps the accounts and makes the calculations, which under the existing system are performed with such facility that the wife's enunciation of the price of the joint follows instantly, and as it were in the same breath, with her husband's statement of the weight and price per pound. Thus, for instance, the butcher's wife requires no appreciable time for calculating that the price of a leg of mutton, weighing 9 lbs. 6 oz., at $8d.$ per lb. is $6s.\ 3d.$ But suppose the price converted into mils, the butcher would call the weight and price "9 lbs. 6 oz., at 33;" the wife could not trust herself to make a mental calculation, but would require a calculating paper; it would of course

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Let me add, that the same computation, professedly worked under the existing system, is in the same circular spun out to 174 figures, while any practical man would work it as follows in 46; 10 of which depend on the addition of 5 per cent., which does not enter into the formula by which the decimal sums are computed:—

	cwt.	qrs.	lbs.			
8)	59	1	16			
	7	1	20	tare.		
	51	3	24			
Add			4			
	52	0	0	at 15s. =	£39	0 0
Deduct			4	= $\frac{1}{28}$ cwt.		6
					38	19 6
					1	18 11
					£40	18 5

A multitude of similar instances of exaggeration of the labour of computation under the existing system occur throughout the publications of the decimalists.

involve a considerable loss of time to put upon paper the following sum, and a hundred similar ones :— J. J. Bennett, Esq.

33
9

297
12

309

and the result would be that in a shop of large custom, instead of the wife being capable, as at present, of keeping the accounts, the butcher would find it necessary to employ one or more clerks for the purpose ; while the customers would also have to go over the calculations upon paper to check their correctness. The baker would be equally puzzled with the butcher to make his calculations on the new system, the figures of which are the most inconvenient possible for these transactions of every day life ; and the remark applies with equal force to the chief commodities sold by the grocer, the cheesemonger, the draper, &c. These tradesmen would one and all consider that person as little better than a madman who should tell them that they would find a great advantage in making their calculations in farthings instead of in pence ; and yet this is essentially the proposal of the advocates of the pound and mil system. It is only necessary to place in parallel columns the range of prices through which the quartern loaf, the pound of meat, the pound of sugar, the pound of cheese, the pound of butter, the pound of soap, the pound of candles, the cwt. of coals, the yard of calico, &c., usually vary, to show the infinite superiority of the present system over that which it is proposed to substitute in its place.

d.		*mils.*	*d.*		*mils.*	*d.*		*mils.*
5	=	21	9½	=	40	14	=	58
5½	=	23	10	=	42	14½	=	60
6	=	25	10½	=	44	15	=	63
6½	=	27	11	=	46	15½	=	65
7	=	29	11½	=	48	16	=	67
7½	=	31	12	=	50	&c.	&c.	
8	=	33	12½	=	52			
8½	=	35	13	=	54			
9	=	38	13½	=	56			

It is unnecessary to point out how vast a proportion of the retail business of the country is represented by the articles to which these figures apply ; or how injurious must be the effect of the conversion of pence into mils on these the most important transactions of the great bulk of the community.

56. It cannot be doubted that the high comparative value of our highest denomination of account is a source of great advantage for both the reasons stated in the question, irrespective of other considerations which make it desirable that it should be retained. But if the alternative should ever arise of abandoning either the pound or the penny, which I sincerely trust will never occur, the balance of "convenience and advantage" is so vastly in favour of the penny that I can have no hesitation in regarding its preservation as of infinitely greater importance.

57. This is one of the many evil consequences which would result from the pound and mil scheme, and which render it, of all the decimal schemes proposed, the most inconvenient for common use.

58—61. These questions can only be answered affirmatively, and present in themselves sufficient objections to the pound and mil scheme to establish its extreme inconvenience in comparison with the existing system.

62 *and* 63. This "absolute change in the value of all the lower coins," or, in other words, the incommensurability of the pound and mil scheme with the existing system in regard to all the ordinary transactions of retail trade, affords one of the strongest objections to its introduction, on account of the never-ending confusion, contention, and injustice to which it could not fail to give rise. Those who speak of such a change in the coinage and accounts of a country as a fact accomplished as soon as commanded, as a thing done "once for all," or even as the work of a month, a year, or an age, ignore alike the experience of every country in which it has been attempted, and the plain dictates of common sense. The idea of the existing coinage and system of accounts is too strongly imprinted in the minds of all to give place, without a long and weary struggle, to any new system ; the prices of commodities would for a very long period be comprehended with difficulty without a constant reference to their values under the old ; and, as these (under the pound and mil scheme) would very rarely coincide with each other, there would be added to the doubts and difficulties of calculation the certainty that either the seller or the buyer must lose by the change. In itself this would be felt, as it is, as gross injustice. I admit freely that under the pressure of necessity,—were our system of coinage and accounts so confused or imperfect (as has been almost universally the case wherever a change has been made) as to give rise to greater injustice,—then, and for that reason only, the lesser evil must be preferred. But firmly believing, as I do, that our existing system is the best that could be devised, or even going no farther than admitting (as the advocates of the change are themselves compelled to admit) that the existing system is complete in itself, and fulfils all its purposes with certainty and precision, I maintain that there is no necessity, that there is not even an excuse, for the perpetration of this injustice. It is said, however, that the amount of injustice would be small, and that what was lost on one side might be gained on another ; but the soundness of this argument, derived from the school which teaches us to "rob Peter to pay Paul," seems to me pretty nearly on a par with its morality. It is certain that in this, as in all doubtful cases, the weakest would go to the wall. A single illustration will suffice to show the working of the change in this particular ; it is not one selected by myself, but one which has been adopted by the most active of the promoters of the pound and mil scheme, as a proof of the facility with which the new system would be brought into operation : it is that of the orange-boy selling

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his oranges at "two a penny." The cry, it is admitted, would be still the same; but the idea attached to the penny would be a different one, and would signify four mils. Now let us see the effect of the change upon the boy's earnings. We will suppose that he starts in the morning with 100 oranges, and that he sells them all before night. For these 100 oranges he has paid 3*s.* under the present system, or their exact equivalent of 150 mils under the new. But under the present system his oranges at "two a penny" produce him 4*s.* 2*d.*; under the new he will find that he has 200 mils, equivalent only to 4*s.* The profit on his day's labour is thus reduced from 1*s.* 2*d.* to 1*s.*, and "he knows the reason why!" One seventh of his scanty earnings have been struck off for the sake of introducing a system which it is supposed will enable those whose dealings are in thousands and tens of thousands to dispense with the services of one or two clerks. Will he, smarting under the sense of injustice and of robbery committed upon himself, be thereby strengthened to resist the temptation, should it fall in his way, of robbing others in return? The wealthy may depend upon it that in their dealings with the poor example teaches more than precept; and that a bad example will never lack imitators, with whom "it shall go hard but they will better the instruction."

I will not dwell upon the difficulties connected with postage, stamps, customs duties, and other taxes, tolls, soldiers' wages, and all the great variety of contracts between man and man into which pence and their subdivisions, inconvertible into mils, enter as an essential element. So much has been already said upon this branch of the subject, and it has been rendered so evident that great injustice would result from the change, that those who recommend it must be regarded as sinning with their eyes open.

64 *and* 65. The question of the supposed advantage to education by "the substitution of simple for compound arithmetic, which it is expected will arise from the introduction of Decimal Coinage," is too large to be treated in the off-hand manner in which the Decimalists have hitherto spoken of it. It demands a thorough and complete examination in all its bearings, the result of which would not, I am convinced, tell in favour of the exclusively Decimal System. Supposing the coinage to be decimalized to-morrow, the difficulties of compound arithmetic would not thereby be obviated or even materially lessened, while weights and measures remain undecimalized; and it is certain that in many cases, as shown by the example given in Question 28, the labour of calculation would be increased. But even with decimal weights and measures, as well as decimal accounts of money, there would still remain a multitude of questions into which the subdivisions of time (years, months, weeks, days, hours, minutes, &c.) enter as essential parts, which could only be worked by compound arithmetic, or by some circuitous substitute. The abolition of compound arithmetic is therefore an untenable assumption, which certainly would not result from the mere "introduction of Decimal Coinage," and which never can be fully carried out. But even were it possible to effect it, would the advantages to education be so great or so unmixed as the theorists maintain? The object of education is the acquisition of useful knowledge; and at least three-fourths of all education is devoted, and justly devoted, to the cultivation of the memory, and the sharpening of the faculties of the mind. It might shorten the process of education, but certainly would not improve it, to limit it to the mere practical necessities of the moment. In this point of view, to cut short the multiplication-table at 10, and to make the processes of addition, subtraction, multiplication, and division as nearly as possible mechanical operations, might perhaps save some time both to master and pupil, but at the expense of cramping the child's faculties, limiting the amount of his knowledge, and obstructing his progress in life. The boy who knows no more of figures than this would amount to might possibly become a hack-clerk, and get through his mechanical work with tolerable correctness, but he would have received no instruction giving him the smallest insight into those multiplied relations of numbers which are and must ever continue to be of the utmost importance in the business of life. Of the past, in the history of which figures standing in a great variety of relations to each other would be continually staring him in the face, he must (as far as those figures are concerned) be content to remain in total ignorance. Of the monies, the weights, and measures of other non-decimalized countries he could take no account. Questions would continually arise, let us decimalize as we may, even in ordinary business transactions, to which he could give no answer. And while he thus felt himself barred, obstructed, and kept down, he would see others, his contemporaries, better instructed and better qualified than himself, taking a higher position, and rising in the world, simply because their parents and schoolmasters had not suffered themselves to be seduced by a plausible theory into the fatal error of denying them a knowledge which it is essential they should possess. The supposition, however, that education would be so limited is simply "a mockery, a delusion, and a snare." The saving of time in education is a mere phantasy, which has no real existence in countries where the coinage has been decimalized, and would be no more realized with us than with them. In all the American school-books on arithmetic that I have seen, without one single exception, (and I have examined at least a dozen of those in common use, and published within the last fifteen years,) compound arithmetic, always including that of the English monies of account (or "sterling money") occupies quite as large a proportional space as in English books of the same character. The only difference between the two is that in the American there is an additional heading with distinct rules for "Federal money," which is not treated of under the title of simple, but under that of compound arithmetic, and many of the questions in which are decidedly compound. In like manner, in French school-books, the rules of simple addition, subtraction, multiplication, and division, are followed by directions, of a more or less complex character, for the performance of the same calculations when (as in money, weights, and measures) decimals enter into their composition; and these rules are succeeded by others having relation to "Nombres Complexes," in which the old French system of livres, sols, and deniers (exactly corresponding in its modes of subdivision with the English pounds, shillings, and pence) takes a conspicuous share. There are also superadded rules and tables for converting the old monies, weights, and measures into the new, and *vice versâ*. From all of which it appears that both in the United States of America and in France, education, far from being simplified, has been complicated, by the introduction of the Decimal System; and who that seriously considers the entire subject can doubt that the introduction of new modes of division for all ordinary things must necessarily have the same result among ourselves?

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I pass over a great many other points connected with the educational part of the question; but there is one which is much too important to be omitted,—I allude to the processes of mental arithmetic, which many acquire by habit and practice alone, and which others derive from rules given by those who have deeply studied the properties of numbers. With a very large portion, unhappily too large a portion, of the community, this is the only arithmetic possible; and yet there are few men, women, or even children of ten years old, of ordinary capacity, who cannot (although entirely uneducated, in the school sense of the term) calculate in our existing coinage all the little money questions which occur to them in daily practice. The power of mental calculation necessary for this purpose has been gradually acquired, like their knowledge of most things around them, by experience; and it seems to me that nothing short of necessity should induce us to deprive them of the fruits of this experience, and to compel them, as it were, to begin the world again with a system of ideas to which they are strangers. The same thing may be said with reference to the peculiar mental calculations connected with almost every branch of trade, the facilities for which depend entirely on the varied relations which figures bear to each other in money, weights, and measures, and which would be abolished under a Decimal System. Within the last 20 or 30 years especially, the art of mental calculation has been brought to great perfection with reference to almost all the purposes of life; its great advantages are manifest; it forms an important part of the education of all who are engaged in trade; and yet it is proposed, by way of improvement, to render all the commonly practised methods of this art useless or impracticable.

In conclusion, I beg to apologize for the unexpected length to which my answers to some of the questions have run. I feel, however, that far from exhausting the practical objections to the adoption of the decimal theory, I have only lightly touched on some of the most obvious, and as it appears to me insurmountable, difficulties of the proposed change in our monetary system.

British Museum, July 22, 1857. JOHN JOSEPH BENNETT, F.R.S.

(*Communicated by Lord Monteagle.*)

H. W. CHISHOLM, Esq.

H. W. Chisholm, Esq.

Answer to Questions 1—11. A main defect in our present coinage is that it is not constructed upon any regular system. Noo definite principle regulates the differences between the several coins representing the units of which our coinage consists:—

The farthing = $\frac{1}{4}$ of a penny, $\frac{1}{48}$ of a shilling, and $\frac{1}{960}$ of a pound.
The penny = $\frac{1}{12}$ of a shilling, and $\frac{1}{240}$ of a pound.
The shilling = $\frac{1}{20}$ of a pound.

It is true that this defect is rather theoretical than practical, and may not cause any inconvenience in paying and receiving ready money, and that the practical inconvenience of the present system may be restricted to its effect in account keeping and calculations. But admitting that the primary object of coinage is the adjusting retail payments, and that in this respect there is no just cause of complaint against the present system, it by no means follows that its disadvantage in other respects, as complicating accounts and calculations, may not justify the substitution of a simpler system, by which these disadvantages may be remedied, and which may at the same time be made quite as applicable to retail payments for all practical purposes. In this case, the axiom "quieta non movere" does not apply. The subject has to be considered in all its details, and almost every transaction of paying and receiving money involves calculations, or keeping accounts, or both. Giving change continually makes a calculation necessary.

It is too much to assert that the question of merit or demerit of any system of coinage is to be determined alone by its applicability to small payments. That may be a fair test for deciding what particular coins shall be issued as multiples of the units; as, for example, the silver 3*d.* and 4*d.* coins. But in considering the whole system of the coinage it is impossible to leave out its working in account keeping and calculations. The great defect of the present system is its complexity, and the more complex the transaction in which the present coinage is mixed up, the more strongly this defect developes itself. The paying and receiving money, by itself, is the simplest operation of all, and in this the defect is not apparent; while in more complicated calculations, such as actuaries are continually engaged in, this defect in the present system is so great that it necessitates the substitution of the Decimal System.

The numerical system adopted throughout the civilized world is a Decimal System practically carried out. The numerical is the primary element in a system of coinage, and the Decimal System is therefore necessarily involved in any system of coinage. The construction of a purely Decimal System of coinage is consequently much to be recommended, as it is evident that a system founded on a single necessary and definite principle, acting uniformly, must be more simple and easy to be comprehended. These qualities would appear to be generally the most favourable to distinctness of conception, to facility of recollection, and to readiness and ease in mental calculation.

The alleged defectiveness of the Decimal principle, the imperfect divisibility of its integers, applies chiefly to this principle as adopted in our numerical system; and who is so bold as to propose altering that numerical system from a decimal to a duodecimal system? to change the natural number of 10 digits to 12?

For a simple divisional process the binary is the most natural, the most general, and the most easy. But the present system of coinage cannot be said to be a binary system; nor is the binary principle much more involved in the present system than in a Decimal System. The duodecimal scale has so far an advantage over the decimal, that 12 is twice divisible by 2, without leaving a remainder, whilst 10 is divisible but once. There is but little practical advantage in 12 being clearly divisible by 3. Division into thirds is very little used, and hardly ever in retail operations. Who asks for a third of a pound of meat, of tea, of sugar, &c.? A yard is divided into halves, quarters, &c., rarely into feet.

12—14. The examples given afford no fair criterion of the relative convenience of the different systems. In retail transactions why should an amount be stated in mils, when it is never now

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stated in farthings? Shillings and sixpences will remain in circulation if a Decimal Coinage is established, and for all vivâ voce transactions seven-and-sixpence will not require to be called 375 mils, more than the same amount is now called 360 farthings. The most convenient form of expression will always be that in common use.

No practical difficulty is found in the mental addition of sums expressed decimally in France, where a waiter in a café restaurant tells you in a moment "l'addition" that is to be paid for breakfast or dinner. Small sums also will be halved as easily as now, when two friends have to divide 1*s.*6*d.* for a cab, and have not the necessary change in their pockets.

An examination of our present coinage shows at once that it is not constructed upon the divisional principle so much as it is upon the principle of multiples. Thus,—

Copper: Farthing, an unit; or as $\frac{1}{4}d.$ may be conceded as divisional.
Halfpenny is divisional.
Penny, an unit.

Silver: Threepence is clearly a multiple.
Fourpence ditto.
Sixpence ditto.
Shilling, an unit.
Florin is clearly a multiple.
Half-crown is practically a multiple, though nominally divisional.
Crown is clearly a multiple.

Gold: Half-sovereign is practically a multiple, passing for ten shillings, though nominally divisional.
Sovereign an unit.

Is not this a practical proof that our coinage is not constructed by a divisional but rather by a multiplicational process, by which process also all our tables of money, weights, &c., are constructed.

The ten digits are the elements of arithmetic, and our arithmetic is therefore decimal arithmetic. Every process of numeration, multiplication, or division must necessarily be more or less a process of decimal arithmetic, which is and must be adapted to it.

15. The primary object of a Decimal System is to get rid of the difficulty and complexity occasioned by fractions with various denominators; and it is obvious that examples in which these fractions are introduced, do not fairly illustrate the general working of the proposed system of Decimal Coinage. Nor are these examples of practical importance. It will be seen that under the present system, the £ is not clearly divisible into $\frac{1}{7}$, $\frac{1}{9}$, $\frac{1}{11}$, $\frac{1}{13}$, $\frac{1}{14}$, $\frac{1}{17}$, $\frac{1}{18}$, and $\frac{1}{19}$ parts, and what practical inconvenience arises in ordinary transactions? This inconvenience is experienced only in more elaborate calculations, and in these decimals are now almost universally employed.

But even supposing that the advantages of the different systems could be tested by the number of figures required, the examples given, if fairly stated, would tell much in favour of the Decimal System. Thus,

		s. *d.*		Pence.		Mils.		Farthings.		£
1 £	=	20 0	=	240	=	1,000	=	960	=	1·
$\frac{1}{2}$ £	=	10 0	=	120	=	500	=	480	=	·5
$\frac{1}{4}$ £	=	5 0	=	60	=	250	=	240	=	·25
$\frac{1}{5}$ £	=	4 0	=	48	=	200	=	192	=	·2
$\frac{1}{8}$ £	=	2 6	=	30	=	125	=	120	=	·125
$\frac{1}{10}$ £	=	2 0	=	24	=	100	=	96	=	·1
$\frac{1}{20}$ £	=	1 0	=	12	=	050	=	48	=	·05
		2 4 6		534		2,225		2,136		2·225
		19 figures		19 figures		25 figures		23 figures		15 figures

16. All the arguments urged in favour of a Decimal Coinage are applicable to a Decimal System of weights and measures, so far as it can be carried out; for it cannot be applied to all measures. The number of days in a week cannot possibly be decimalized, nor can the number of weeks in a month, or months in a year; in fact, all the measures of time are safe from its operation. The only question among the advocates of a Decimal System appears to be how this system can be most advantageously introduced, in order that it may be generally applied. A very little consideration will show that the attempt to introduce too great a change at once would lead to certain failure, and that the application of the Decimal System to coinage in the first instance would be most favourable to its success, and to the general adoption of the system.

The regulation and issue of the coins in circulation are in the hands of the Government, who have thus the power of enforcing throughout the kingdom the adoption of a Decimal Coinage, should such be established by law. It is probable that it is only by this being first effected, that it will be possible practically to establish a Decimal System of weights and measures. A far less important change, the uniformity of the present system of weights and measures throughout the country, though established by law, has failed in being established in practice, being contrary to the general disposition of the people. How then is it to be hoped that a Decimal System of weights and measures would be generally adopted, or could be enforced, even if established by law, unless the public mind were prepared and predisposed to receive it? And by what means is this effect so likely to be produced as by first establishing a Decimal System of coinage? This is in itself a simple process, a practical application of the Decimal System to money, the article of all others the most frequently in use, and by all classes of the community. The principal difficulty of its introduction consists in the change from the present system, and this having once passed, the minds of the public must necessarily become familiarized with the operations of the Decimal System, and cannot fail to perceive and to appreciate its advantages, if they be such as its advocates allege. These considerations appear conclusive as to the expediency of establishing a Decimal Coinage in the first instance.

30. In countries where the Decimal Coinage has been adopted has a single instance occurred of the practice of making up articles in tens instead of dozens? Gloves, in France, for instance. But should this be the consequence of the introduction of the Decimal System, what inconvenience would result? As a general rule the most convenient practice will be adopted and will regulate itself.

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34. The superiority of the Decimal System is here admitted in a very large number of cases; but, although the most common subdivision of articles purchased in retail transactions is binary, this is far from being universally the case in material subdivisions of length, capacity, and weight. The Apothecaries' drachm is divided into three scruples, and the scruple into twenty grains. In the old Troy weight the ounce is divided into twenty pennyweights, and has been recently decimalized. The ton is divided into twenty hundredweights. The inch upon the mathematical scale is divided into tenths.

The example given of the ordinary subdivision of the yard into halves, quarters, &c., suggests further matter for consideration. The tabular subdivisions of a yard are not binary; it is subdivided into three feet, and the foot into twelve inches. The result is that these tabular subdivisions are not used when binary subdivisions are required, these last being applied directly to the yard as an unit. This fact tends to show that as a matter of convenience the question of these subdivisions may be safely left to the public to adjust for themselves.

But leaving out of consideration the admitted superiority of the Decimal System in so large a number of cases, does it at all follow, from the natural and convenient practice of binary subdivision of articles purchased in small retail transactions, that the £ sterling should be similarly treated? What identity or relation is there between the yard of ribbon, or the pound of tea, and the £ sterling? or between the yard of ribbon, as an unit to be subdivided, and the price of the yard of ribbon, which is no unit at all? The yard of ribbon is as likely to be sold for 10*d.* as for 1*s.*, and the pound of tea for 4*s.* 9*d.* as for 5*s.* In the cheap ticketed shops it is a common practice to insert a small ½*d.* after the large 6*d.* a yard. Does the grocer find it necessary to ticket "our mixture of coffee" at 1*s.* 4*d.* a pound instead of 1*s.* 6*d.* or 1*s.* 9*d.* to accommodate subdividing purchasers? In these cases all the apprehended difficulty of subdivision of money now exists uncomplained of.*

If, however, the binary subdivision of our coinage for the purposes of small retail transactions, should still be considered of the first importance, and as necessary to be provided for, may it not be possible to make an arrangement for this object, whilst for all other purposes the Decimal System may be generally established?

Assuming that the £ sterling must necessarily be the unit of the Decimal Coinage, it must be allowed to be a great disadvantage that it is an integer of so high a value, that the cent or 100th part must continually be further subdivided for all small fractional payments, whilst the mil, or 1,000th part, is of much smaller value than is required for these purposes. Again, the practice of stating sums in mils will in all cases largely increase the amount, and will tend to add to the number of figures, and to the difficulty and labour of accounts and calculations. It is true that the inconvenience of these results will be much lessened by practically making five mils the lowest fraction, as the penny is at the present time. But five mils are equal to half a cent, and may not one step farther be taken, and ten mils or one cent be made practically the smallest money of account, subdividing it, when actually required for small transactions, into half-cents, nearly equivalent to the present penny, and quarter-cents, to the halfpenny? For all purposes of calculation the cent may be decimally extended, but what advantages are proposed to be gained by the use of mils in actual coinage? And will not every purpose be answered by continuing the penny and halfpenny, and even the farthing, for small payments in the manner suggested?

This suggestion appears to be in accordance with the practice of all countries where the Decimal System is completely carried out, the ultimate subdivision of the coins being binary (47); it would appear also to combine some of the alleged advantages of the penny unit (excepting alone the change in its value) with those of the £ unit, and to meet all the difficulties of calling in the present copper coinage.

There would thus be two moneys of account only, pounds and cents. As to the silver coinage,—

The crown would remain - -	=	25 cents.
The florin „	=	10 „
The shilling „	=	5 „
The sixpence, changed into, and	=	2½ „

The half-crown, now worse than useless in co-circulation with the florin, the fourpenny, and threepenny pieces, might be called in, and one and two cent pieces issued.

43. In illustration of the last suggestion, an additional column shows the mode of writing down the several amounts given as examples of this question.

£ s. d.		Pence.		Mils.		£
1 0 0	=	240	=	1,000	=	1.
0 6 8	=	80	=	333·333	=	·33
0 5 0	=	60	=	250	=	·25
0 3 4	=	40	=	166·666	=	·16
0 2 6	=	30	=	125	=	·12½
0 1 3	=	15	=	62·5	=	·06¼
1 18 9		465		1,937·499		1·23¾

54. Is the mil unavoidable?

62. The question as to the difficulties arising from a change in the value of the lower coins is answered by referring to the effect of similar changes in countries where the Decimal System has been established, and particularly to the assimilation of the Irish with the English currency in 1817.

Exchequer, May, 1857. H. W. CHISHOLM.

* Since these remarks were written, they have been tested by observation of the ticketed shops in Oxford Street. The first shop noticed was a linendraper's, the window being filled with dresses, ticketed at various prices from 3*s.* 3*d.* to 16*s.* 9*d.* the dress. No other or divisible article was ticketed. The second shop was a haberdasher's, the window filled with ribbons, ticketed at the following prices per yard: 6¾*d.*, 7¾*d.*, 8¾*d.*, 9¾*d.*, 10¾*d.*, 11¾*d.*, 1*s.* 2½*d.*, and 1*s.* 3½*d.*,—and at no other or more easily divisible price. The third shop was another linendraper's, with a number of similarly ticketed dresses, together with a few rolls of muslin, ticketed at two prices only, 9¾*d.* and 10¾*d.* a yard, "any length cut." It was impossible not to be struck with the fact that very few articles indeed exhibited in the shop windows throughout the street were at all divisible for the purposes of sale.

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(*Communicated by Lord Monteagle.*)

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Before replying to the questions in order, I make some remarks on their general character.

In the first place, I desire it may be distinctly understood that I do not consider either the questions or the arguments implied as emanating from the noble proposer, but only as passing through him. This understanding, convenient as a form, may be suspected from the questions themselves to be founded on fact. The excessive repetition which occurs is, I should think, to be attributed to the questions being collected from different sources. I think it very unlikely that question 28 came from the same head as most of those preceding. The bulk of my answers was written before I had seen the evidence now accessible in the Preliminary Report. The noble Lord's paper of questions coincides in argument with the witnesses whose evidence is detailed in that report. I therefore respectfully tender the following answers to Her Majesty's Commissioners as evidence in chief, and I trust that I shall be permitted to submit myself to cross-examination on all the points thus raised. I hope I need hardly deprecate the idea of my unequivocal attack upon the soundness of the views which the questions advocate being meant to imply some sort or degree of disrespect to the noble proposer. Of him I take the liberty of saying that he has materially served the cause. The nation will never consent to any change in the coinage until it is assured that its hard grasp of old usage has been well and earnestly represented in the previous deliberations. This has now been done. I can hardly imagine any position of defence for our existing state which has not been taken in the questions: the definite manner in which those questions are put, and the clear view they give of the grounds on which they stand, will convince those who cling to our actual coinage that all the strength of their case has been displayed. I may add that this same clearness and definiteness has saved much trouble in drawing up the answers.

Next, I consider the questions themselves to be, not questions, but Socratic arguments, to which the answers are to be replies. But though the arguments are implied, the answers must be expressed; so that the replies must oftentimes be at some length.

Thirdly, I desire it may be observed that the questions themselves are repeated variations of very few arguments. Such repetition of attack renders necessary, to some extent, a corresponding repetition of reply. I could condense all these questions into ten or twelve; but this would open liability to charge of evasion. I shall therefore follow the lead of the questions until the reader's sense of fatigue joins his reason in thanking me for some abbreviation of answer. I need not insist on the value of these repetitions as showing the small compass within which the arguments in favour of our existing state really lie.

Fourthly, The *animus* of the questions is the desire to preserve the existing system unaltered, playing off the proposed *penny scheme* merely as an antagonist to the *pound and mil* scheme; the apparent intention being that the two opponent schemes should destroy one another, and leave the existing state of things in peace. I shall pay but little attention to the *penny scheme*. I have not the least fear of this plan. I do not for a moment imagine it possible that this country will take to reckoning in pence, while all the results of reckoning are to be converted, for payment, into pounds, shillings, and pence, by what books of arithmetic call *reduction*, or else by tables. I do not think very detailed argument necessary against a scheme which, when a man goes to draw his balance from a banker, supposing that balance to be 275,933 pence, will set the banker's clerk at the following work before he knows what notes or coins to pay with, he having previously had the reverse work with every sum paid in.

12)275,933

20)2299,4 - 5

£1149 - 14 - 5

I believe that if this plan had offered any advantages it would have been adopted long ago; for so long as a person makes his demands and his tenders in pounds, shillings, and pence, he may keep his books as he pleases, no law withstanding, but only usage. For these reasons I shall be somewhat brief on the penny scheme, which I am satisfied will not be recommended by any Commission, adopted by any House of Commons, or tolerated by any numerable fraction of the people at large.

The penny system halts between two suppositions. Sometimes it is not to affect the coinage; sometimes it is to result in a tenpenny coinage, the tenpenny pieces, with higher silver and corresponding gold, being gradually introduced. The *questions* treat the tenpenny system as one of merchants' calculation only, supposing all our coinage to remain as it is. I have therefore made my answers correspond to the questions. Had any allusion been made to the gradual introduction of silver francs or tenpences, to be mixed in confusion with the shillings for ten or twenty years, I should have had something to say on that part of the subject. But it must be particularly remembered that the questions suppose a *reckoning* by pence with our present coinage, to which point therefore the answers are directed.

Fifthly, I shall set down in order a few of the points on which I hold the questions to imply statements or opinions essentially unsound.

1. The disposition to undervalue existing difficulties of calculation as applied to small sums, shown in the constant effort to suppose that the calculations of the poor are small *adjustments*, and that the word *calculation* is to be reserved for larger operations. So that when the querist mentions his opponent's assertion of the great facilities which decimals afford in *calculation*, he allows himself to imply that *calculation* means only large accounts.
2. The tendency to pit the present system, well learnt, against the decimal system, not yet learnt at all in detail. The learner of the decimal system is compared with the proficient in

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the ordinary system; and the time when the common system shall be forgotten, and all education founded on decimals, is never taken into prospect. In these questions the supposition is that the transition period lasts for ever.

3. The more easy cases of our present system are paired for comparison with the more difficult cases of the decimal system.

4. The existing system is tried mainly on the supposition that *even prices* are the rule of the market; that *a shilling a pound* is the universal basis of calculation. Nothing like close questioning is attempted as to broken prices, except in one question, in which the arithmetician of the common system is suffered to divide by 24 *in his head*, while the poor decimalist cannot multiply by 2 without writing down *once* and *once*, and adding.

5. The existing system is spoken of under all the circumstances which aid comprehension. The decimal system is treated as only numeration from the lowest coin, without any attention to the resting-places which are afforded by the higher coins.

6. It is asserted and implied, again and again, that the effecting of *payments* in retail is *the* purpose, the only purpose, of coins.

7. It is assumed that the decimalist is never to be allowed to use common fractions.

8. It is assumed that the subdivision of the lowest coin into halves, &c. in countries where the coinage is decimal, is an argument against decimal coinage, to the entire neglect of the fact that countries which have a decimal coinage highly value it, though, as they show, they are not insensible to the use of common fractions in suitable and convenient places.

But it must be conceded, on the other hand, that the questions are wholly free from some absurdities very common among opponents of the pound and mil scheme. They do not bring forward the usual dirge upon the fraction of a farthing which the possessor of some copper pieces must lose, for once, on the day when the change takes place: the only question asked on this point (No. 62.) is a sensible one, fully deserving of consideration and answer. They do not enable us to amuse ourselves with the supposition that we mean applewomen to transact business by help of ·0041666666666666 *ad infinitum*.

These questions are the first attempt I have seen to bring the advocates of the pound and mil system to a close and hand to hand controversy with the existing system. In such a trial of strength the weak points of both systems may appear, but the weak point of the assailant's system is sure to be discoverable from his mode of attack. I think it will be obvious what is the weak point of the present argument in favour of the existing system, to all who look on the manner in which comparison with decimals on *broken quantities* at *broken prices* is avoided, in spite of the importance attached to this case in question 28. In the answer to question 64 I have made an offer to which I respectfully invite the attention of the noble proposer and of the querists who speak through him. I will make that offer a source of strength to the pound and mil system if it be declined, of more strength if it be met by unfair instances, of most strength of all if it be met by fair instances. The case which happens shall, in its degree, reinforce the conclusions I have drawn from the questions themselves, that is, from their excessive adherence to *a shilling a pound*, and their silence on shillings and pence per pound, or pence and farthings per pound.

Sixthly. The answers here given do not contain a full exposition of the advantages of decimals: *they only answer the objections proposed.* A great deal more might be said on the superiority of what may be called *natural* arithmetic over a system which must be placed in opposition as *unnatural*. There is not skill enough in it to allow of the application of the term *artificial*.

QUESTIONS

Drawn up with the view of bringing under distinct Notice and Examination some of the Advantages of our present System of Coinage, and some of the principal Objections and Difficulties which have been suggested with respect to the proposed introduction of the Decimal Principle.

They are to be understood as intended to promote a thorough and effectual investigation of the validity or invalidity of the arguments submitted by the opponents of the proposed change; and they are not to be taken as intimating any conclusive opinion on the points referred to.

"The best opportunity is thus (by written memoranda, afforded for a mature consideration of statements made "and of arguments adduced in support of (or in opposition to) measures proposed for consideration, and the most "effectual precaution taken against misconstruction and hasty inconsiderate decision."—*Peel Memoirs*, vol. II. p. 99.

I.

QUESTION.

1. Do you think any change in our present system of coins desirable?

ANSWER.

I think that the small change in the *small change* requisite to make our coinage decimal is more than desirable, as means of progress both in business and in education. The change consists in lowering the copper money four per cent., by which the half shilling becomes sixpence and one farthing, and the pound 1000 farthings. Decimal division follows of course, with great facilitation from the power of comparing the old and new system given by the smallness of the change.

QUESTION.

2. On what grounds does your objection to our present system of coins rest?

ANSWER.

On the ground of its rendering calculations necessary which are quite different from those of common *decimal* arithmetic, and much more difficult; so that, as is well known, we are at a disadvantage from which all countries which have a decimal system are free.

QUESTION.

3. Do you consider them as defective or inconvenient for any of the purposes of retail transactions, *i.e.* for paying or receiving? Or is your objection restricted to the inconvenience of our present coinage for the purposes of account keeping and calculation?

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ANSWER.

I deny that "paying and receiving" include all the "purposes of retail transactions." There is rarely payment or receipt without *calculation*, written or mental. I consider our coinage defective and inconvenient for all the details of business which precede the actual handing over of the computed sum.

QUESTION.

4. What do you consider to be the primary purpose of coins? Do you consider them as fractional subdivisions of the integer created for the purpose of adjusting retail payments? or do you consider their primary character to be that of instruments, the purpose of which is to facilitate accounts and calculation?

ANSWER.

The *primary* purpose of coins of *value* is to substitute a Government guarantee for constant assaying and weighing. The *primary* distinction of *tokens* arises out of the abolition of two standards of value. But, substituting "more important" for "primary," both the purposes mentioned are so very important, that I cannot see which is the more important. Which is the more important constituent of water, oxygen or hydrogen? Water is not water if either be wanting. And in like manner coin is not coin for the business of life, unless it both adjust payments and facilitate calculation.

QUESTION.

5. If one of those purposes must to some extent be sacrificed or made subordinate to the other, which do you think is entitled to the priority in our estimation?

ANSWER.

It depends entirely upon the *extent* of the sacrifice. Sacrifice a small amount of either convenience for a large accession to the other. Throw a sprat to catch a whale. Above all, face a moderate and *temporary* inconvenience as to either, to gain a decided and *permanent* accession to the other. But I do not believe that the proposed change demands any sacrifice of either.

QUESTION.

6. Is not the coinage chiefly concerned in the process of buying and selling by retail? and must not the question of the merit or demerit of any system of coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments? Are you aware of any complaint against our present system of coins in this respect?

Is not *the use of coinage*, that is, the fitness of the coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small payments which arise, the consideration of primary importance, rather than the improvement of a system of account keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

ANSWER.

Here are four questions. I first point out and deny two assumptions which they contain.

The first is that retail business is all payment and *adjustment* of payment. Now there is more calculation in retail business than in large transactions. Wholesale, a hundred pounds changes hands by a few strokes of the pen; retail, it goes in driblets over pages of figures. The words *adjustment of payment* either include *calculation*, or they do not. If they do not, a great omission is made as to retail business. If they do, then in the use of the word adjustment lurks the implication that small calculations arise in small sums, and large calculations in large ones. To expose this take the following questions: *Calculate* $4\frac{1}{2}$ per cent. on 126,000*l.*? *Adjust* $4\frac{1}{2}$ per cent. of 0*l.* 13*s.* $8\frac{3}{4}$*d.* Both to be done within a farthing. I suspect that *adjustment of small payments* is confounded with *small adjustment of payments.*

The second assumption is that *calculation* is for the educated and affluent, *adjustment* for the poor. A bad system of coinage is a far greater tax on the poor than on the rich: upon the education of the poor it is a tax of tremendous magnitude. The calculations of the poor are far more difficult than those of the rich, and also more numerous.

To the questions I now reply:—

First, Coinage *and its computation* are chiefly concerned, as to number of transactions, in retail matters; and in retail matters the advantage of decimals will be as much felt as in wholesale ones, and perhaps more.

Secondly, In the present case merit or demerit need not be decided even upon a balance of classes of transactions: it is affirmed that all kinds of transactions, great and small, will gain in an enormous majority,—nearly all—of actual cases. It is quite true that this question, like most others, ought to be tried by its convenience and advantages with respect to the poorer classes. If this principle had been put into active operation but half as often as it has been made a breakwater against agitation for improvement, the education of the people would have been such as to make the introduction of decimal coinage, weights, and measures, a matter of perfect facility.

Thirdly, Giving to *calculation* or *adjustment*—I do not care about names—its proper importance, there is serious reason to prefer a decimal system to our present system. Our complaint against the present system,—if complaint be the proper word,—is that there exists another, attainable with very slight alteration, and possessed of much superior capabilities. It is very common to call the proposal of *better* a complaint against *good enough if no better may be*; and thence to infer that *better* must not be acceded to until *good enough &c.* has been proved *bad.* This is all fallacy; we know that Britain is what it is under the present system, just as London is what it is under the present state of the Thames. Improve the coinage and cleanse the river, nevertheless.

Fourthly, The facilities of decimals belong to the market as well as to the counting-house, to the small coins as well as to the large, to the poor as well as to the rich, to the family account-book as well as to the ledger.

II.

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QUESTION.

7. Do you recommend the introduction of the *decimal* principle into our coinage?

ANSWER.

I recommend the *completion* of the decimal system in our coinage, which, though far enough removed to deprive us of the advantage, is near enough to make the change very easy. In the bullion trade, in various dividend calculations of the bank, in some custom house measurements, in engineering calculation, &c., decimals are used; necessity has forced their introduction.

QUESTION.

8. Is it not impossible under the decimal system to break the integer into as many clear fractional parts as we now obtain under our present system of coins?—Do you not consider that this is an objection to the decimal system?

ANSWER.

The number 10 has not so many divisors as 12. This is, for certain cases, a *disadvantage* of the decimal system; that is to say, the decimal system would be more convenient still, if 10 had more divisors. But it is now much more convenient than the duodecimal system. Before I allow that the want of divisors is an *objection* to the decimal system, I must know what is meant by the word. Sometimes it means a disadvantage only; sometimes a disadvantage conclusive against adoption. In the second sense, the want of divisors is not an objection; in the first sense the disadvantage is greatly exaggerated.

The extra divisors of 12 are of little use in broken prices, such as 2*s.* 9*d.* a pound, 7*d.* a pound. More than 90 per cent. of the questions which go near the point are proposed on the idea that prices are usually even shillings.

QUESTION.

9. In an old but very remarkable treatise on coin and coinage (Vaughan, 1675) this passage occurs:—

"Of all the numbers, twelve is the most proper for money, being the most clear from fractions " and confusion of account, which ought not to be neglected, by reason that of all other " numbers it is most divisible, being divisible into units, as all numbers are; into two " parts, as no odd number is; into three parts, as no even number is but six, and the " numbers that consist of sixes; into fourths, into which six is not divisible; and into " sixths."

In the memoir dictated by Napoleon at St. Helena, on the new French system, is this passage:—

" On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux facteurs 2 et 5, et " que 12 en a quatre, savoir, 2, 3, 4, et 6. Il est vrai que la numération décimale, géné- " ralisée et exclusivement adaptée au mètre comme unité, donne des facilités aux astro- " nomes et aux calculateurs; mais ces avantages sont loin de compenser l'inconvénient de " rendre la pensée plus difficile. Le premier caractère de toute méthode doit être d'aider " la conception et l'imagination, faciliter la mémoire, et donner plus de puissance à la " pensée."

What validity is these in these considerations as objections to the introduction of a decimal system of coinage? Or, in what does the fallacy of them consist?

ANSWER.

When an old writer is stript of his conceits, translated into correctness, and under those changes presented as a sage of antiquity, the only way to meet his authority is to restore his true form, and to allow his whole character to be judged. Whether the divisors of 12 gain anything by Mr. Vaughan's advocacy may be ascertained by reading the whole passage, of which a part is quoted in the question. The punctuation may be excused, since the work was printed after the author's death by his crochetty brother, Henry Vaughan, *the Silurist*. He is speaking of the proportion of gold to silver in value, which he would have 12 to 1, because 12 has many divisors. (pp. 73, 74.).

"But the most, and the most Judicious Propositions that I have seen, both at home and in other parts, do agree upon twelve for one, as the most equal Proportion; and it agrees with the Proportion of *Spain;* upon which in this Subject, we ought principally to have our eye fixed: and for my part, I do the rather incline to this Proportion, because 12 of all the numbers is most proper for Money, being the most clear from Fractions and Confusion of an Accompt, (which ought not to be neglected) by reason That of all other numbers is most divisible, being divisible into unites, as all numbers are into two parts, as no odd number is; three parts, as no even numbers is, but 6 and the numbers that consist of sixes into fourths; as 6 is not divisible: And to the 6ths this Proportion seems like to square with the Conceipt of the *Alchymists*, who call Gold *Sol*, and Silver *Luna*, whose Motions do come near upon the point of 12 for 1....."

Vaughan was a clever attorney, who had read more out of law than he was able to digest. Sir William Petty will be allowed to have a much better judgment by all who have read in both. In his *Quantulum-cunque*, reprinted in 1856 by the Political Economy Club, it has been pointed out to me that he speaks as follows:—

" The use of Farthings is but to make up Payments in silver," [N.B.—Copper farthings and silver pence were then in circulation,] "and to adjust accompts, to which end of adjusting accompts let " me add that if your old defective farthings were cryed down to five a penny you might keep all " accompts in a way of Decimal arithmetic which hath been long desired for the ease and certainty " of accompts."

Decimals, as I shall immediately notice, were not well understood in Petty's time. His system would give 1,200 farthings to the pound. But his main point evidently was, that the multiplier 5, by its relation to 10, is an easier multiplier than 4. And even to command as much relation to pure decimalism as is seen in 60 farthings a shilling, 20 shillings a pound, the author of the *Political Arithmetic* was willing to lower the farthing 20 per cent.

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Mr. Vaughan lived at a time when decimal fractions were not familiar to the mass of arithmeticians. It would be easy to show that, up to 1700 at least, the mastery over decimal fractions which is common in our day was almost confined to high mathematicians. Mr. Vaughan's statement merely amounts to this, that 12 is better than 10, because it has more divisors. The answer is that 10 is better than 12, because it is the radix of our common system of counting. Mr. Vaughan's objections would be exceedingly valuable if a new *system of numeration* were to be under contemplation.

Napoleon *at St. Helena* is no authority. He had never been a shopkeeper or a money calculator, and if he had been, his position at St. Helena was not favourable to sense or candour. He was grumbling at all creation; nobody knew his own business, not even the general who commanded against him at Waterloo. He is very unfortunate in his expressions. He adopts the erroneous supposition that the decimal system is only useful to *scientific* calculators, and styles them *astronomes et calculateurs*. Now the astronomer is the only scientific calculator to whom, as such, decimalisation is impracticable. He is in such continual connexion with the records of his science that he cannot afford to decimalise angular measure. He is a merchant who wants all his ledgers for 2,000 years past. The French tried it and failed; it is the only part of the metrical system which is not in use at this day, except indeed the *tenth* day of rest, which being only an attack on religion disappeared with the return of Christianity. Scientific calculators in general use decimals, and they want the world at large to have the advantage which they feel every day of their lives.

QUESTION.

10. Must not there be an inferiority as regards fractional divisibility in any decimal system of coins, as compared with a coinage founded on a combination of the binary with the duodecimal scale?

ANSWER.

No. The balance of advantage is in favour of decimals by a great deal. Our present coinage, luckily for us, is not wholly founded on a combination of the binary and duodecimal (the word should here be *ternary*) systems. Its best point is the entrance of the decimal factor into the first division of the pound. The great convenience of the reckoning of prices by shillings is one consequence. The attempt to reckon by pence is found convenient also: but a man stops before the second shilling; the duodecimal conversion is inconvenient. We hear much of seventeen and eighteen pence, but nothing of 28 pence or 33 pence. But we hear of prices in shillings up to and past one hundred shillings. If the pound had been 12 shillings this would not have happened. The decimal system will allow this convenience to be much extended.

QUESTION.

11. Is not there great force and truth in the remark of Napoleon, that a decimal system of dividing the integer and of expressing the fractional parts must be less favourable to distinctness of conception, to facility of recollection, and to readiness and ease in mental calculation, than a binary or than our present system?

ANSWER.

To me neither force nor truth. Napoleon tacitly assumes that all the readiness *acquired under* the present system is *given by it*. When a person has practised our present system, and has not practised a decimal system, he has more distinctness, more recollection, and more mental power in the system which he has practised, than in the other. But let two pupils, equally ignorant of both, be educated in the two systems, and teachers know that the pupil who is educated in the decimal system will acquire distinctness, memory, and mental power faster than the other. And for a good reason. The decimal learner has his foundation already laid, the arithmetic of ordinary number. The other has to learn his pence table, and to *acquire* on twelves a poor portion—he never gets more—of the facility which the other *starts with* on tens. None except teachers, and writers who observe closely, know what miserable work the world at large make of the pence table; so miserable, that they would soon—I mean in a few days—be more of decimalists than they are now of duodecimalists, without any schooling except daily business.

QUESTION.

12. Ex. gr.: Which is the more easy for conception, for recollection, or for addition mentally?

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

Again; we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 375 mils?

The half of 2*s.* 6*d.* is 1*s.* 3*d.*, but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.* 125 mils, &c. &c.?

Take another case. Any number of yards—7, 8, or 9 yards at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 mils per yard:

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market?

Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person in his head, without pen and ink or pencil, and in the midst of confusion?

But try the same process upon the same sum in decimal notation, namely, as 125 mils, Will the calculation be equally simple and easy?

Now try it in pence, namely as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy?

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Again: Price's Patent Candles are advertised in 12lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally? 12lb. boxes at 5·50 mils each, how much per lb.?

Again:

		s.	*d.*	Pence.		Mils.
1 yard or lb.	=	2	6	= 30	=	124, for more easy calculation than 125 mils.
$\frac{1}{2}$	do.	= 1	3	= 15	=	62
$\frac{1}{3}$	do.	= 0	10	= 10	=	impossible.
$\frac{1}{4}$	do.	= 0	$7\frac{1}{2}$	= $7\frac{1}{2}$	=	31
$\frac{1}{6}$	do.	= 0	5	= 5	=	impossible.
$\frac{1}{8}$	do.	= 0	$3\frac{3}{4}$	= $3\frac{3}{4}$	=	impossible.
$\frac{1}{10}$	do.	= 0	3	= 3	=	impossible.
$\frac{1}{12}$	do.	= 0	$2\frac{1}{2}$	= $2\frac{1}{2}$	=	impossible.
$\frac{1}{15}$	do.	= 0	2	= 2	=	impossible.
$\frac{1}{24}$	do.	= 0	$1\frac{1}{2}$	= $1\frac{1}{2}$	=	impossible.
$\frac{1}{30}$	do.	= 0	1	= 1	=	impossible.

Now, consider the comparative convenience in making the necessary payments.

2*s.* 6*d.* is paid with one coin. How many coins will be required to pay 124 mils?

1*s.* 3*d.* is paid with two coins. How many coins will be required to pay 62 mils?

Is it not by cases of this kind that the relative convenience of different systems of coinage must be tested?

ANSWER.

In the additions proposed there are two distinct points of unfairness.

First, the easy case of one system should have been joined with an easy case of the other. Shillings and threepences rank, as to facility, with florins and cents. It is no answer to say, that the second addition is a translation of the first: the easy cases of one system do not translate into the easy cases of the other. I should think it very unfair to propose the following as a recommendation of the pound and mil system:—Which is more easy for conception, for recollection, or for addition mentally—

fl.	ct.		*s.*	*d.*
7	8		15	$7\frac{1}{4}$
3	1		6	$2\frac{1}{2}$
1	9		3	$9\frac{3}{4}$
0	3		0	$7\frac{1}{4}$
£1	3	1	£1	6 $2\frac{3}{4}$

The second point of unfairness is the presentation of the existing system under all its facilities for conception, while the decimal system is treated as nothing but numerical aggregation of its lowest coin. The decimalist divides 78 cents into 7 florins, 8 cents; the follower of the existing system wants process and calculation to bring back 7*s.* 9*d.* into 93 pence. The proposer, in adding 7*s.* 6*d.* and 2*s.* 6*d.* lumps the shillings, and catches the fact that the pence give an odd shilling; but he omits to notice that we do the same with 7fl. 3ct. and 2fl. 7ct.. He wants to bind us to 73 and 27, without partition. Again, he will not allow the new shilling to be 5 cents, it must be 50 mils. He asks, can you do 9 yards at 50 mils a yard, as easily as I do 9 yards at one shilling a yard? We answer, *Not quite.* We might ask, Can you do 9 yards at $2\frac{1}{2}$*d.* a yard as easily as we do 9 yards at one cent. a yard? He ought to answer, *Not by a good deal.* Our retort is unfair, but it is quite as fair as the attack.

In the same manner he proposes *dozens*, and forgets that a decimal coinage must introduce the habit of packing by *tens*, unless experience should show that dozens do perfectly well with decimals, in which case the argument drawn from dozens is annihilated.

And further, he chooses nothing but *even prices*. He finds out that 2*s.* 6*d.* will divide in many ways, in which 124 and 125 will not. But all who frequent the shops and the markets know that, in all matters connected with the daily supplies of the poor, even prices are the exception, and broken prices the rule. The Commission will surely take evidence on this point. They will call the small shopkeepers, and will find out how bread, meat, vegetables, beer, tea, sugar, coffee, milk, pepper, candles, &c. &c. are sold. Or they will read the evidence given to the Committee of the House of Commons, which would satisfy most people on this point. And in one way or the other they will find that even prices belong to things which are seldom broken, but that in all things which are much subdivided the chaffering and cheapening of the market keeps prices continually broken.

Try 2*s.* 3*d.* a pound, or $7\frac{1}{2}$*d.* a pound, or even 7*d.* a pound; find all the fractions laid down in the question, and the superiority of common division applied to 112 mils or 29 mils will be apparent; especially in finding the *mil or farthing above* the inexpressible price.

Again, as to number of coins, selected instances tell either way. It will probably take 3 coins to pay one eighth of a pound, or 125 mils, now paid in one coin. But it will take only one coin to pay $2\frac{1}{2}$*d.*, or its nearest equivalent, now paid in three coins.

As to such even prices as do exist, the present system has a tendency to *force them* by its difficulties of calculation. This is injurious to all parties. Any system under which the farthing is brought into greater prominence will benefit the poorer classes by its tendency to keep natural prices, and prevent settlement at the even fourpences. A great deal might be said on this one point.

QUESTION.

13. The defectiveness of any system founded on the decimal principle consists in the imperfect divisibility of its integers.

Is not the construction of coinage necessarily a divisional process? Is it not the metrical subdivision of the integer for fractional payments in connection with retail transactions?

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"While decimal arithmetic for the purposes of *computation* shoots spontaneously "from the nature of man and things, it is not equally adapted to the numeration, "the multiplication, or the division of material substances."—J. QUINCY ADAMS, *Secretary of State Reports to Senate of United States*, 1821, p. 8.

ANSWER.

One great defect of all systems which are *not* decimal consists in the difficulty of division of *mixed integers*, which is by far the most common case.

Coinage is not necessarily a *divisional* process; it is as often *multiplicational*. The common ready reckoner is, and always has been, a book of multiplication. Coinage is intended to facilitate *calculation* as well as *payment*, both in large and small transactions.

Mr. Quincy Adams is oracular, but not clear. If decimal arithmetic shoot spontaneously from the nature of *things*, how is it not adapted to *material substances?* The truth is that decimal numeration arises rather from the nature of *fingers* than of *things in general*. And it is an advantage of decimal coinage that it brings in the fingers again, which nobody can use to any purpose upon shillings and pence. But instead of commenting further upon what I am not sure I understand—the *nature of things* being the Mrs. Harris of argumentative discussion—I will take this occasion to introduce some remarks suggested by the first paragraph of the question.

The power of dividing is an important element in the capabilities of a system of coinage. There are two things to consider,—its *difficulty*, and what the proposer calls its *possibility*, that is, possibility of result without fractions over. In *all* systems these impossibilities are and must be excessively frequent, especially in the smallest transactions. But in difficulty, upon the fair average of broken and even sums, the existing system must be much harder than the decimal system.

The practised computer has some helps from what is called *practice*, and from an inverted rule, which is never set down in books of arithmetic, for a reason we shall see. For example, at 13*s.* 9*d.* a pound, how much an ounce and a half? Sixpence is 8*s.*, and 3*d.* is 4*s.*, and 1*s.* 9*d.* is 21*d.*, of which 1*d.* is 16*d.*, say 10*d.* and $\frac{5}{16}d.$ or $10\frac{1}{4}d.$, and $1\frac{1}{2}$ ounce is $15\frac{1}{2}d.$ How comes it that this method of dividing by rising to the mark through obvious steps, this inversion of multiplication by practice, is not in the books of arithmetic? Because the writers are well aware that no one will acquire it except by frequent practice *on instances of one kind*, aided by *memory of essential steps* gained by daily repetition, fortified by the confidence which arises from previous knowledge of *something near the answer*. The grocer's man is quick and sure at turning a lump of shillings and pence per pound into per ounce; the waiter at the Greenwich tavern is equally quick and sure at dividing the bill by the number of guests. Let the two change places, and both lose courage and with it power. The grocer's man knows something about the price from the very look of the goods; the waiter has as near a guess from what he has seen of the table during dinner. Both have some idea what to take. We now see why such rules are called *practice*.

Now, first, though the decimal system yields a somewhat larger crop of impossible divisions upon the *even prices*, it is at no disadvantage, but the contrary, upon the fair average of all prices.

Next, the facility of its *full work* often makes the full work bear comparison as to facility with the short mental process of the existing system, when there is one, which happens oftener in selected cases than in actual business.

Thirdly, all the short rules of the existing system have their counterparts in the decimal system. For instance, division by inversion of practice. Thirteen proverb-scouting guests have dined, and the bill is 16*l.* 7*fl.* 9*c.* *Waiter* (*sotto voce*): '1*l.* is 13*l.*, and 2*fl.* is 2*l.* 6*fl.*, and 1*s.* is 13*s.*, and 54*c.*, which is 4*c.* and 2 over. (*Aloud.*) Gentlemen, 1*l.* 3*fl.* a piece is 11 cents more than the bill, and what you please more for the waiter.' The waiter will do this faster than the Commissioners or myself could follow him. Some waiters will remember that 13 times 13 is 169, which settles it immediately; these easy cases come in proportionally as often as the easy cases of the common system.

It is much to be wished that the questions had gone into broken prices.

QUESTION.

14. In the following table compare the three systems, the present, the mil, and the penny system. With which does the superiority rest as regards,—

1. Number of figures used?
2. Conciseness of expression in words or in writing?
3. Facility for mental conception of the sum stated?
4. Tendency to promote accuracy in copying or calling over?
5. Facility for calculations, especially those which must be made in the head?
6. Interchangeability at equivalent value with the coins now in use?

£	s.	d.		Mils.		Pence.
1	0	0	=	1,000	=	240
0	17	8	=	883	=	212
0	15	6	=	775	=	186
0	9	9	=	487	=	117
0	6	3	=	312	=	75
0	5	7	=	279	=	67
0	4	10	=	241	=	58
0	3	8	=	183	=	44
0	2	4	=	112	=	28
0	1	5	=	70	=	17
4	7	0		4,342		1,044
27 figures.				34 figures.		28 figures.

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If we now proceed to subject these total sums to division, which system will be found the most convenient?

4*l.* 7*s.*, divided by 3, 4, 6, and 12, gives the respective sums, 1*l.* 9*s.*, 1*l.* 1*s.* 9*d.*, 14*s.* 6*d.*, 7*s.* 3*d.*

Pence 1,044, divided by 3, 4, 6, and 12, gives the respective sums of 348 pence, 261 pence, 174 pence, 87 pence.

But 4,342 mils is not divisible without a remainder by any of these divisors.

ANSWER.

The Socratic method of arguing has the advantage of necessarily conducting attack in a refreshing tone of sarcasm, which very much relieves a dry subject, and which has the further merit of bringing out both strength and weakness. Had it but been allowable to demand that the numbers of figures required by the systems should be tested by one example selected by one side, the strength of the conclusion would have been reinforced by the irony of the question, 'With which does the superiority rest as regards,—1. Number of figures used?' But looking at the utterly inadmissible nature of the claim to decide such a superiority by one instance chosen by one side, the irony is retorted by answering, '*So far as appears,* undoubtedly with the common system, because even 28 is greater than 27, much more 34.'

Instead of replying upon one instance, in which pence are set against mils, I shall make a full comparison of the number of figures in different cases.

And to other suppositions I add this, that in banking accounts no cheques will be paid below cents. I fully believe that if the pound and mil system were established to morrow, the bankers would insist upon this rule, not so much for saving a column, as for getting rid of all dealing with copper. *But as those with whom I am arguing will not admit this, I shall only show the result.* And I shall consider the penny system both with reference to *farthings,* and also with reference to *tenths of a penny;* since the advocates of that system have not made up their minds which they would prefer. I shall make two averages in each case; one from sums under one pound, one from sums under 100 pounds. The following are the results:—

Numbers of figures in 100 *sums of money. Pound and mil system carried to cents., compared with other systems carried to pence.*

	Sums under 1*l.*	Sums under 100*l.*
Pound and mil system to cents	190	389
Common system to pence	267	457
Penny system to pence	254	454

Pound and mil system, to mils, compared with the other systems to farthings, and also with the penny system to tenths of a penny.

	Sums under 1*l.*	Sums under 100*l.*
Pound and mil system to mils	289	489
Common system to farthings	400	590
Penny system to farthings	404	604
Penny system to tenths of a penny	354	554

Now, not taking the first line of all, in deference to the opinion that the banker will still deal in copper, it appears that at present 100 sums of money under 100*l.* require 457 figures; in the pound and mil system, 489. That is, one additional figure to three sums of money. And this supposes that the banker always writes *something* in his column of mils: 0 or 5. Against this, I put the following alleviations, to use a wrong term, for their total amount more than destroys the inconvenience by a great deal.

First, both systems are practically in five columns; for the second column of shillings is a working column, with its facility greatly overbalanced by its insecurity. It is not ruled; so that if the 1 in 18 shillings be a little out of place, it may chance to be omitted in running down. And 1 shilling may easily be advanced to the dignity of a half sovereign in running the eye rapidly down the shillings to catch the tens. All this mixture and its insecurities are abolished. I am not sure I have not overrated the *facility* of this column. Adding units is easy work; but when those units are tens, with cumbrous units to be carried with them, there is more difficulty. Thus, when the units column of shillings gives 58, the clerk has to go on with 68, 78, 88, 98, 108. 118, &c. This is by no means so easy or so sure as 5, 6, 7, 8, &c.

Secondly, the column of mils, supposing it retained, will be filled either with *noughts* or *fives.* If *fives* only be entered, the other places being blank, it is equivalent to striking off a figure for every *two* sums, which actually brings the average number of figures of the *bankers'* pound and mil arrangements below the number required at present. If I were left to myself on this matter, I should leave the column blank when 0 would otherwise fill it, and write v, an easy mark, much easier than 5, in all other cases. In adding this column I should collect the v v v v, &c. by *twos.*

But the whole question as to number of figures is strangely distorted in importance. Every calculator knows that when the routine flows easily and continuously, the figures tumble off so rapidly that he is astonished when he comes to count them. Anything which makes the pen heave-to, disturbs the line of action of the mind, and introduces the fear of error, is of far more consequence than half-a-dozen of figures gained by calculation. The saving of the use of the pence table, and the destruction of the dangerous second column of shillings, is worth more than the mere writing of two figures in each sum. But it must be clearly understood that this argument does not apply to figures which are to be taken up by the mind, and then either written down or used in checking. Here a perceptible addition to the number of figures would be a disadvantage. One figure in three sums of money would not be felt. And there would be an advantage in taking up and in calling over, on the side of the decimal system, which I will now explain.

In reading off, whether for use or check, the sums must be read by coins. Thus 33*l.* 17*s.* 4*d.* requires the distinct reading of 33, 17, 4, by which figures it is generally called over. Now when three lots are read, it is a very serious disadvantage that the middle and separating lot is of a fluctuating number of figures, sometimes one, sometimes two. Any one who has ever called over feels sensible of relief when a lot of sums occurs in which the shillings are only units, or under 10. And the listener is placed at a disadvantage by the constant occurrence of a moment of unsettled

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meaning. In the *teens*, our language reads the ten *after* the units. In calling over the above sum, the listener hears *thirty-three*, *seven*, and it may or may not happen that the syllable *teen* is to follow. And such mistake as 7 for 17, and 17 for 7, is more likely to occur in calling than any other.

Now in the pound and mil system the florin figure, always single, would form a most convenient break between the fluctuating pounds and the mils. Thus 33*l.* 8*fl.* 45*m.* would be called over as *thirty-three, eight, forty-five.* This single figure of florins would be a rest for the mind and a security to the ear. Any one who will try this point may easily satisfy himself of the truth of these remarks.

The six questions at the beginning are now answered as follows :—

1. Fair averages being taken, the augmentation of figures in the pound and mil system is not perceptible, being at the rate of one figure to three sums of money, and this only when *noughts* are *written* in the column of mils. And if, as I believe, banking transactions should stop at cents, the pound and mil system will have an advantage of not far from one figure to each sum of money.
2. As to conciseness of expression, no one can predict what form of abbreviation the great master of the *norma loquendi* will adopt. And there is nothing which excites so much laughter as the prediction of a popular abbreviation. But in words at length, the pound and mil system competes well with the existing system. When farthings are in question, this is so obvious as not to need an instance. When pence only are employed there is nothing to choose. Thus *eighteen shillings and sevenpence* has eight syllables, *nine florins and twenty-nine mils* has eight syllables also. Instances might be given which make the turn of a syllable either way.
3. As to mental conception of the sum stated, I refer first to the answer to question 12 on the proposer's tendency to put the existing system into coins, and to express the pound and mil system entirely in mils. When equally familiar, the pound and mil system has the advantage of having only one figure in each sub-division. Thus 9 florins, 9 cents, 9 mils, is more convenient for mental conception than 19 shillings, 11 pence, 3 farthings.
4. As to accuracy, &c. in calling over, see the previous part of this answer.
5. As to facility of calculation, look at the very addition proposed. No answer is needed to any one who denies the very great saving of labour which the decimal system affords in all written calculation. As to mental calculation, it will grow as the decimal elements become familiar. It is much to be wished that the questions would come to close-quarters on headwork *in broken sums of money.* I cannot do it, because the questions must be proposed by the advocates of the existing system. All the presumptions at starting are in favour of the simple system, which reckons by the common reckoning of numbers. If those who wish to keep out *common counting*, and to retain the plan which substitutes 12 for 10, affirm that either written calculation or headwork is easier in their system than in the other, it is for them to bring it to trial. Instances chosen by their opponents are liable to be charged with partiality of selection.
6. As to interchangeability of equivalent value with the coins now in use. The sovereign, the half sovereign, (the crown, the half-crown, if they remain,) the shilling, the half-shilling, undergo no change of value. All the other coins are lowered four per cent. What matters it that four mils will not exchange with an *old penny*, when the old penny has ceased to exist. The coin which did exchange with four farthings is lowered at the same rate as those farthings, and will exchange with the four lowered farthings, or mils, if they be so called.

The last part of the question is again on division; and I repeat again that the facility of the decimal system, *as to both even and broken money*, far more than compensates the accurate divisibility of the present system in certain cases of even money.

QUESTION.

15.

		s.	d.		Pence.		Mils.
1 £	=	20	0	=	240	=	1,000
$\frac{1}{2}$ £	=	10	0	=	120	=	500
$\frac{1}{3}$ £	=	6	8	=	80	=	—
$\frac{1}{4}$ £	=	5	0	=	60	=	250
$\frac{1}{5}$ £	=	4	0	=	48	=	200
$\frac{1}{6}$ £	=	3	4	=	40	=	—
$\frac{1}{7}$ £	=	—		=	—	=	—
$\frac{1}{8}$ £	=	2	6	=	30	=	125
$\frac{1}{9}$ £	=	—		=	—	=	—
$\frac{1}{10}$ £	=	2	0	=	24	=	100
$\frac{1}{11}$ £	=	—		=	—	=	—
$\frac{1}{12}$ £	=	1	8	=	20	=	—
$\frac{1}{13}$ £	=	—		=	—	=	—
$\frac{1}{14}$ £	=	—		=	—	=	—
$\frac{1}{15}$ £	=	1	4	=	16	=	—
$\frac{1}{16}$ £	=	1	3	=	15	=	—
$\frac{1}{17}$ £	=	—		=	—	=	—
$\frac{1}{18}$ £	=	—		=	—	=	—
$\frac{1}{19}$ £	=	—		=	—	=	—
$\frac{1}{20}$ £	=	1	0	=	12	=	—

By this table it appears that going down as far as the shilling the £ is divisible under our present system, and under the penny system, into eleven distinct aliquot parts; whilst under the mil system, it is divisible only into six aliquot parts.

But observe further the subdivisibility of the quotients obtained under the present and the penny system, compared with those obtained under the mil system.

The $\frac{1}{8}$ £ represented by 2*s.* 6*d.* or 30 pence, or 120 farthings, is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, giving respectively 1*s.* 3*d.*, 10*d.*, 7½*d.*, 6*d.*, 5*d.* &c.; whilst the same sum, represented by 125, mils is divisible only by 5 and 25, giving as the result 25 mils and 5 mils.

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Again: the $\frac{1}{10}$ £, represented by 2*s.* or 24 pence, or 96 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48, giving respectively 1*s.*, 8*d.*, 6*d.*, 4*d.*, 3*d.*, 2*d.*, $1\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, and $\frac{1}{2}$*d.*; whilst the same sum, represented by 100 mils, is not divisible into a third or an eighth part, or any of their subdivisions.

The same may be said again of the shilling, which, represented by 12 pence or 48 farthings, may be divided by 2, 3, 4, 6, 8, 12, 16, 24, giving respectively the sums 6*d.*, 4*d.*, 3*d.*, 2*d.*, $1\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, $\frac{1}{2}$*d.*; whilst the same shilling, represented by 50 mils, is divisible only by 2, 5, and 25, giving the sum 25 mils, 5 mils, and 2 mils.

Now let us compare the three systems with reference to the number of figures requisite for stating the fractions of a £ which are obtainable under each of the three systems:—

		s. *d.*		Pence.		Mils.
1 £	=	20 0	=	240	=	1,000
$\frac{1}{2}$ £	=	10 0	=	120	=	500
$\frac{1}{4}$ £	=	5 0	=	60	=	250
$\frac{1}{5}$ £	=	4 0	=	48	=	200
$\frac{1}{8}$ £	=	2 6	=	30	=	125
$\frac{1}{10}$ £	=	2 0	=	24	=	100
$\frac{1}{20}$ £	=	1 0	=	12	=	50
		2 4 6		544		2,225
		19 figures.		19 figures.		25 figures.

ANSWER.

Again the questions harp on the divisibility of even sums. Oh for a little broken money! Why this careful abstinence from all mention of subdivision of shillings, pence, and farthings in one lot? Now I take the question of the divisors of £1 in both systems.

How comes it that the great instrument of interest, the ever-recurring *per-centage divisor*, 100, is omitted? How comes it that no reference is made to the frequent sales by hundreds, two hundred and fifties, thousands? I decline to stop at 20, and proceed to enumerate what I believe to be the useful divisors of money. They are 2, 3, 4, 5, 6, 8, 10, 12, 16, 20, 24, 25, 28, 48, 50, 56, 100, 112, 120, 200, 250, 500, 1000. Of these the pound, in farthings, is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 16, 20, 24, 48, 120, in all *thirteen*. And the pound in mils is divisible by 2, 4, 5, 8, 10, 20, 25, 50, 100, 200, 250, 500, 1000, in all *thirteen*.

Now the pound in farthings—difficulty of calculation apart, which is putting out of sight a very important matter—has a more useful lot of divisors than the pound in mils, so long as packets are made in *dozens*. But when the packets come to be made by tens, as they certainly will be, the pound in mils will have a more useful lot of divisors with relation to *ten* than the pound in farthings has with relation to *twelve*. In this way:—

Those who reckon by dozens call a dozen dozen the *gross*, and a dozen *gross* the *great gross*. Now the pound divides by 12, but not by 12 times 12. But when 10 takes the place of the dozen, 100 and 1000 will take the place of the gross and of the great gross. Now look at the following questions:—

At 1*s.* $2\frac{3}{4}$*d.* a piece, how much the dozen, the gross, and the great gross?

14*s.* 9*d.* the dozen
12

177*s.* the gross
12

2124*s.* the great gross,
or £106 4*s.*

At 112*l.* 17*s.* 6*d.* the great gross, how much the gross, dozen, and single article?

112*l.* 17*s.* 6*d.*
20

$12)2257\frac{1}{2}$*d.* the gross
$12)188\frac{1}{8}$*d.* the dozen
$15\frac{2}{3}$*d.* the article
and $\frac{1}{96}$*d.*

At 61 mils a piece, how much for 10, 100, 1000?

6 *fl.* 1 *ct.* for 10
6*l.* 1 *fl.* for 100
61*l.* for 1000

(all by inspection).

At 112*l.* 8 *fl.* 75 *m.* the 1000, how much for 100, 10, and 1?

11*l.* 2*fl.* 8*ct.* 7*m.* $\frac{1}{2}$ for 100
1*l.* 1*fl.* 2*ct.* 8*m.* $\frac{3}{4}$ for 10
1*fl.* 1*ct.* 2*m.* $\frac{7}{8}$ a piece

(all by inspection).

I have put down the accurate fractions in both cases, leaving every one to his own mode of statement or rejection. From the constant reference to the dozen, and mention of our existing system as *duodecimal*, one would suppose that it really offered the same facilities with reference to twelve which the decimal system offers with reference to ten. The preceding examples show that it does not.

Not that we complain of it on this account. For 20 is more of the decimal than of the duodecimal character; and so much the better.

III.

QUESTION.

16. Is the introduction of the decimal principle into our coinage desirable without reference to what may be the system of weights and measures in this country?

ANSWER.

I entertain a great respect for this question, which I considered with much care and much repetition three-and-twenty years ago, when I first began to think about decimal coinage. It is by

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far the most difficult thing on which a beginner in the subject has to make up his mind; and no person has thought properly on the subject until he has turned it over and over again.

If decimal coinage must be looked on as sure to bring about decimal weights and measures, the question is merely this:—Will the intermediate period, during which coins *are* decimal and weights and measures *are not*, be a period of so much inconvenience that it would be better to decimalise all at once.

But I shall propose another question, my answer to which will of course exempt me from all answer to the preceding. Would it be worth while to decimalise coins, if it were certain that *weights and measures never would be decimalised at all?* It is my decided and long fixed opinion that it *would* be very well worth while.

If our weights and measures all ran in harness with our coinage, if four small ones made the next greater, if 12 of the next greater made the next greater still, and if 20 of the next greater still made the greatest of all, I am not prepared to say what I should come to upon the question whether the coinage *alone* should be decimalised. To the first strong impression in the negative I should oppose my recollection of the early time when I felt rather strong on the propriety or decimalising coins, weights, and measures all at once. I see a good deal to be said in favour of decimalising *coinage alone*, even in the case supposed. But no such case exists. Our weights and measures neither accord with the coinage nor with one another. Troy weight, now useful only to bullionists, comes the nearest to the coinage, which in fact springs out of it. And even here there is a curious inversion, which I do not remember to have seen explained.

Troy weight.	Money.
Twelve ounces one pound.	TWENTY shillings one pound.
TWENTY pennyweights one ounce.	*Twelve* pence one shilling.

But in all the other cases money has nothing in common with weights and measures, except an infusion of the binary principle, very differently introduced in the two. The consequence is that even money and even measures do not match with any striking facility, and broken money and broken measures have no relations worth noting. Hence, taking into account the immense superiority of the decimal coinage as an engine of calculation, and the fact that many calculations are made on money for one which is made on pure weight or measure, I hold that the advantage of decimal coinage is well worth obtaining, without any reference to weights and measures.

I would decimalise coinage first, because it is desirable to begin with one thing at a time, and to choose the easiest way of beginning. The coinage system can be decimalised without any withdrawal of actual coins or introduction of new ones, except what could be done at leisure; for higher convenience, not of primary necessity.

I would decimalise coinage first, because it is desirable to teach decimals by something which all come in the way of learning from. Money comes often to all, weighing and measuring does not come often to a great many. When the decimal system has been practised upon coins, it will come easily as to weights and measures.

I would decimalise coinage first, because the coinage is close to decimal coinage already. One more farthing in the half-shilling, and it is done; there will be 100 farthings to the florin, 10 florins to the pound.

I would decimalise coinage first, because it could be done speedily. Before weights and measures can be decimalised there must come a discussion about details, compared to which the discussion about the coinage will be trifling indeed. As yet, those who would decimalise weights and measures are not agreed about their units.

I would decimalise coinage first, because the greatest part of the advantage which will result to education can be gained from it at once; for the books of arithmetic copy actual life in this point, namely, that the far greater part of the calculations are made upon money.

I would decimalise coinage first, because this great practical improvement is within our reach, and because we, the English, have always found it suit our complaint best to get what good we can as soon as we can, and not to refuse anything because we cannot immediately get all. The person who will not pick the low branches until the ladder comes to help him to reach the higher branches too, deserves to wait for fruit until it drops from the moon, and is quite in the way to get his deserts.

QUESTION.

17. Commodities are divided for the retail purposes of the market by means of our weights and measures, and the practical purpose of coins is to effect the payment for those retail purchases. Can the adjustment of our system of coinage be properly disconnected from the adjustment of our system of weights and measures?

ANSWER.

Mere *payment* is not *the* purpose of coins: it is *one* purpose, calculation is another. See the answer to question 16 for the rest.

QUESTION.

18. At present our system of weights and measures, and our system of coins, may be considered as binary. Can it prove consistent with public convenience to abandon the binary, and to adopt the decimal system in our coinage, unless we have decided on the same course in our system of weights and measures?

ANSWER.

Our weights and measures cannot with truth be *considered* as binary, because they *are not* binary. The only binary system in our medley is the system of measures of liquids and dry goods up to the quarter. Neither is our coinage binary. We cannot abandon what we have not got. Our medley consists of different kinds of mixtures of the binary, ternary, quinary, septenary, and composite, so heterogeneously put together that broken measures and broken moneys are as much separated, nearly, as if all the systems were entirely different.

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19. If the retail transactions of the community originate in a system of weights and measures, by which the hundredweight is divided into 4 quarters, the quarter into 28 pounds, and the pound into 16 ounces; and in which, again, the lineal measure, the yard, is divided into 3 feet, and the foot into 12 inches; will a coinage, founded on the decimal principle of division, afford a greater facility for the adjustment of such retail transactions than the coinage which now exists?

ANSWER.

At even prices there is little loss, at broken prices there is great gain. I could have wished that the proposer had dealt in instances of broken transactions; but all his attempts at close quarters are on even money. If a hundredweight cost 91*l.* 11*s.* $7\frac{3}{4}d.$? how much does a pound cost? also the same at 91*l.* 5*fl.* 8*ct.* 2*m.*? The direct ways of doing this are as follows, in the two systems. I omit fractions in the common system, because the work is usually exceedingly tangled; I insert them in the decimal method, because they are mere play. If any one likes to put on the fractions in the common system, he is welcome to do so: the work is easy enough in the instance chosen.

(*a*)

4) 91 11 $7\frac{3}{4}$

4) 22 17 11

7) 5 14 $5\frac{3}{4}$

0 16 $4\frac{1}{4}$

(*b*)

4) 91·582

4) 22·8955

7) 5·723875

·817696

8*fl.* 1*ct.* 7*m.* $\frac{696}{1000}$ *of a mil.*

In the existing system 17 *process figures* are written, the answer being wrong by the 112th of a farthing. In the decimal process 19 process figures are written, the answer being wrong by about the 2500th part of a mil; and the matter would have been more against the existing system, but for the accidental divisibility of 5*l.* 14*s.* $5\frac{3}{4}d.$ by 7. In the very last question it was stated that the existing systems might be considered as *binary:* surely 7 is not a binary factor. This factor 7 is an awkward thing to deal with in adapting it to our *quarto-duodecimo-vicesimal* coinage. We have to turn 5*l.* 14*s.* into 114 shillings, and divide it by 7 in the head; unless, indeed, we demand subsidiary paper calculations in the common system. It is, however, the fact, that with all but expert hands the common system does demand little *bye-calculations*, of which its advocates take no notice whatever. I have loaded the decimal work with fractions of mils, merely to show how much allowance against itself that system can afford. It would really be done thus, except for the precautions taken against a reader who may "lie at the catch," as John Bunyan phrases it.

(*c*)

4) 91·582

4) 22·896

7) 5·724

·818

Ans. 8*fl.* 1*ct.* 8*m.*
Too much by about $\frac{3}{10}$ of a mil.

Twelve process figures instead of 17, no *bywork*, not a moment's strain upon a head which contains the common multiplication table, work incomparably more easy, and risk of error very much lessened. But I confess that I have not given the easiest way of finding the price of 1lb. at 91*l.* 11*s.* $7\frac{3}{4}d.$ per cwt. In producing that easiest way, I give the unkindest cut of all at the quarto-duodecimo-vicesimal hodge-podge. The shortest and best way of proceeding is to render 91*l.* 11*s.* $7\frac{3}{4}d.$ into florins, cents, and mils (the rule may be learnt once for all in five minutes), giving 91·582, to work as above, and to render ·818 back into 16*s.* $4\frac{1}{2}d.$ A little more consideration show that 16*s.* $4\frac{1}{4}d.$ is nearer. I affirm, and I only wait for instances produced by antagonists to prove it, because instances chosen by myself might be suspected, that the shortest way of dealing with the *common system* is to learn the head-rule for conversion into *decimals*, to transfer the data into *decimals*, to work in *decimals*, and to transfer the *decimal* answer back into the *common system* by the head-rule. *But this is for those who use decimals:* the world at large must learn abstract decimals from concrete coins, not the way to mend their coins from decimals.

I put down all the actual processes which go through the mind in the cases (*a.*) and (*c.*), which represent the mode of dealing with the nearest farthing of the common system, and the nearest mil of the decimal system.

(*a.*)

In 9, 2; in 11, 2; $\frac{3}{4}$ of 1*l.*, 15*s.*; in 11, 2; 15 and 2, 17; 3*s.*, 36 and 8, 44, 11. In 22. 5; $\frac{1}{2}$ of 1*l.*, 10*s.*; in 17, 4; 10 and 4, 14; 12 and 11, 23, 5; and $\frac{3}{4}d.$ 5*l.*, 100 and 14, 114; in 11, 1; in 44, 6; 2; 24 and 5, 29; 4; 4 and 3, 7; $\frac{1}{4}d.$

(*c.*)

In 9, 2; in 11, 2; in 35, 8; in 38, 9; in 22, 6. In 22, 5; in 28, 7; in 9, 2; in 16, 4. In 57, 8; in 12, 1; in 54, 8.

What I have entered as shadowing out the consequences of the 4, 12, 20 of the common system is decidedly less than it ought to be. And the difference of trouble and of risk of error cannot be represented by type, any more than the complex variety of routine.

QUESTION.

20. Take the case of an article now selling at a shilling per pound or per yard, and retailed in halves, quarters, ounces, or inches, these fractional quantities are easily and readily paid for in our present coins. But if our coinage be subjected to the decimal principle of division, will not that facility be lost?

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A shilling a pound again! Try 3*s.* 4½*d.* pound, 17½*d.* a pound, or 11¼*d.* a pound, and compare he power of payment with that of the decimal system. Are meat, bread, tea, sugar, candles, &c. always at even money the pound? Does not the evidence taken by the Committee of 1853 show that the fraction of a farthing, and the tradesman's rule of taking the whole farthing, is the cause of considerable keenness of calculation among the poor?

QUESTION.

21. Under our present system,—

			Mils.	Pence.
1lb.	=	one shilling	50	12
½lb.	=	sixpence	25	6
¼lb.	=	threepence	12·5	3
⅛lb. or 2 ounces	=	three halfpence	6·25	1½
1/16lb. or 1 ounce	=	three farthings	3·125	¾

In cases of this kind will the ordinary transactions of the market be carried on under a decimal system with simplicity or convenience comparable to that which is obtained by the present system?

ANSWER.

A shilling a pound again! Answer as before. I take this opportunity, in reference to the example given, to make a remark on the methods which would be followed under a decimal system.

Nothing is more common among opponents of decimals than the assertion or implication that the decimalist is *never to use a common fraction.* Now it ought to be known that the decimalist, perfectly alive to the existence of common fractions and to the mode of using them, intends to use them whenever they will be more convenient. He uses $\frac{5}{10}$ of a mil instead of ½, or ½ of a mil instead of $\frac{5}{10}$, as he judges best. He is sworn at Highgate never to use decimal fractions when common fractions are more convenient, unless he likes decimal fractions better, which, in the case supposed, he is wise enough not to do. In written calculation he will rarely use common fractions, because decimal fractions are easier. In mental calculation, so long as our present weights and measures remain, and longer too if he should see reason, he will use binary or other fractions for the purpose of head calculations, in aid of decimals. At a shilling a pound, or 50 mils a pound, he will see that an ounce is 3 mils and ⅛ of a mil; and with these he will calculate ounces, and will know that the odd mil comes in at half a pound. And if any opponents should urge that he is abandoning the decimal principle, he will reply that the decimal principle, like all other principles, is to be held by only as long as it is convenient. The common run of people, accustomed to know when the turn of the farthing takes place in their present system, will find the odd eighth of a mil easy enough. But it will matter little; for the even shilling is not a common price in things of common consumption.

QUESTION.

22. Would a change from our present to a decimal system of notation and of coins secure any advantages in brevity of expression, in facility of stating accounts, in simplicity of form, in speed or accuracy of calculation, or in facility of payments?

ANSWER.

This question has been answered before in its various details. But objections may be answered in various ways. I shall, in this present answer, give one or two *extreme cases,* not meaning to imply that everything is like the extremes, but only that, in the long run of cases, the decimal system insures a large per-centage of the benefit of the extreme cases. In this particular the extreme cases of the decimal system have the better of the extreme cases of the common system. The much vaunted exactness and facility of answer which occurs at an exact shilling a pound vanishes altogether, and leaves no vestige behind, at by far the greater number of broken prices. The even money cases of the common system are no more extreme cases than sound pavement is an extreme case of muddy clay; they are *isolated* and *exceptional* cases. But the extreme cases of the decimal system which I bring forward are genuine extrême cases, the ridges of a gradual rise.

Brevity of expression. Which is most simple as to expression, 999*m.* or 19*s.* 11¾*d.*, 146*m.* or 2*s.* 11¼*d.*?

Facility of stating accounts. The power of instantaneous reduction from mixed coins to mils, or *vice versâ,* gives many facilities of statement.

Simplicity of form. Simplicity of form is the basis of the proposed alteration. Thus, *uni*formity is simplicity in matters of calculation, and uniformity is seen in 10 mils one cent, 10 cents one florin, 10 florins one pound; and is not seen in 4 farthings one penny, 12 pence one shilling, 20 shillings one pound. And there is simplicity of form in the choice of 10, the radix of our numeration.

Speed of calculation. Suppose we ask how much per cent. is 13*s.* 2¾*d.* in the pound, no uncommon kind of question. In the common ways it might be done as follows; but many writers on arithmetic are shy of *practice* in such cases, and work out the full rule of three. While writing these answers I was at a business meeting, in which a collector's poundage was stated at 3½*d.* One of my colleagues, a clear-headed man at common arithmetic, asked how much per cent. is that? By help of 14 mils, I answered, as soon as the words were out of his mouth, one pound eight shillings nearly. With an instant's hesitation I could have answered, 1*l.* 9*s.* 2*d.*

13*s.*	is	13 × 5	or	65	0	0 per cent.
2*d.*	is	⅙ of 5	or	16	8	„
½*d.*	is	¼	or	4	2	„
¼*d.*	is	½	or	2	1	„
				66*l.*	2*s.*	11*d.* per cent.

Or thus:—4)300
75
12)275
22–11
20)1322
66–2–11

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The following is the process for those who are trained in the common way :—

1*l.* 13*s.* $2\frac{3}{4}$*d*

12

960 158

4

635

100*l.*

960)63500(66*l.* 2*s.* 11*d.*

576

590

576

14

20

280

192

88

12

1056

96

96

96

0

The nearest question in decimal money is as follows:—How much per cent. is 6*fl.* 6*ct.* $1\frac{1}{2}$*m.* in the pound? Answer, *by inspection*, 66*l.* 1*fl.* 5*ct.* per cent.

Is nothing gained in speed here? Again, it is proposed to find the pounds, shillings, and pence in 146923 farthings.

4)146923

12)36730–3

20)3060–10

153*l.* 0*s.* $10\frac{3}{4}$*d.*

How many pounds, florins, cents, and mils are there in 146923 mils? Answer, *by inspection*, 146*l.* 9*fl.* 2*ct.* 3*m.*

The reduction of either of the two, poundage or per-centage, into the other by inspection, the utter abolition of the *work* of reduction of mixed coins, are surely gains in speed. They are extreme cases, but they are extremes which are gradually approached. I now try the following:—If 17*l.* 12*s.* $11\frac{3}{4}$*d.* yield 24*l.* 2*s.* $0\frac{1}{2}$*d.*, how much will 156*l.* 13*s.* $7\frac{1}{4}$*d.* yield?—This belongs to a numerous class of questions in the common system, the class *out of which pence and farthings are often struck in order to save work.*

17*l.* 12*s.* $11\frac{3}{4}$*d.*

20

352

12

4235

4

16943

24*l.* 2*s.* $0\frac{1}{2}$*d.*

20

482

12

5784

4

23138

156*l.* 13*s.* $7\frac{1}{4}$*d.*

20

3133

12

37603

4

150413

23138

1203304

451239

150413

451239

300826

4)

16943)3480255994 (205409

33886 12)51352–1

91655 20)4279–4

84715

69409

67772

163794

152487

11307

213*l.* 19*s.* $4\frac{1}{4}$*d.* and $\frac{11307}{16943}$ of a farthing

The accident of two cyphers in the quotient (against which it was 8 to 1) saves four lines of work in the division. I propose the corresponding question in decimal money. If 17*l.* 6*fl.* 4*ct.* 8*m.* give 24*l.* 1*fl.* 0*ct.* 2*m.*, what will 156*l.* 6*fl.* 8*ct.* 1*m.* give?—I have given a mil additional to the last sum to avoid a simplification, and I have not taken advantage of the first two sums being both

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divisible by 2. I have used the *contracted division* at the end, it being a certainty of the decimal system that contracted multiplication and division will be taught and used.

17·648 24·102 156·681

24 102

313 362
15668 1
626724
313362

17648)3776·325462(213·9803
35296 213*l.* 9fl. 8ct. $\frac{3}{10}$m.

24672
17648

70245
52944

173014
158832

14182
14118

64
53

11

In the first example the number of figures which mean processes is 139; in the second it is 94. But those who are properly trained in *common arithmetic* will have only 66 figures, by doing the multiplications and subtractions of the division in one. This method is common on the continent, and those who use it affirm that it is easier and safer. I fully believe them, after many years' experience of it in use and in teaching. It is one of the greatest mischiefs in education of the quarto-duodecimo-vicesimal hodge-podge, that it draws the attention of the learners off from common arithmetic at the very time when they might begin to learn many simplifications.

Accuracy of calculation. Diminution of processes is increase of accuracy, because the more to do, the more chance of a slip. Simplification of processes is increase of accuracy. Easier management of the small fractions at the end is increase of accuracy. Every burden taken off the memory is increase of accuracy. Uniformity of system is increase of accuracy, because details have more practice. Additional power of verification is increase of accuracy. All who use logarithms (and they will be all who can be called expert calculators in 10 years after the establishment of decimals), will have means of *verification* at hand, which they will use until they learn that the original process may often be discarded in favour of the verifying process. The sliding rule will come in as a means of verifying the leading figures at sight. A business calculator, an actuary or accountant, with responsibility on his mind, would give one more protection to his client's interest and his own character by a sliding rule six or eight inches long, which would warn him of any error as large as one in a thousand in a multiplication or division, by merely a slide and a look.

QUESTION.

23. In the report of the discussion, at the Institution of Civil Engineers, of Mr. Yates' Paper on the French system of Measures, Weights, and Coins, the following passage occurs (p. 60):—

> "The pound sterling, consisting of 960 farthings, admits of 19 divisions* without a "remainder; but if divided into 1,000 parts, it only admits of 8 divisions. Existing "weights and measures are chiefly reckoned by 2, 4, 8, 12, 20, 24, 36, &c., which "admit of divisions by existing monies; but if a monetary decimal system be "adopted, without also adapting it to weights and measures, it must be evident that "the number of fractions will be greatly multiplied. Decimal coins will not accord "with the fractions of a pound of 16 ounces, nor with those of a yard of 36 inches. "Purchases of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, &c. of any integer could not be paid for decimally without "incurring a loss by fractions not represented by coins. Now those are precisely "the quantities in which the working classes principally make their purchases; "consequently they would be the chief sufferers by the introduction of a decimal "coinage, unless there is a simultaneous adoption of decimal weights and measures. "This anomaly was severely felt in the United States, and to obviate the inconve-"nience, Spanish pieces of $6\frac{1}{4}$ and $12\frac{1}{2}$ cents, although illegal coins, were of necessity "employed."

Must the truth and force of this statement be admitted, or, if not, what answer can be given to it?

ANSWER.

Already answered. The quotation assumes a close accordance between the system of coins and the system of measures. No such accordance exists. What are the United States going to do with their binary coins? If what I have heard be true, they must not be quoted any longer on this subject. [Since the above was written, I have seen the details of the act of congress, calling in these binary subdivisions of the dollar, and I have also seen a report of the sub-committee of the chamber of commerce of New York, on decimal weights and measures, which speaks of "the readiness with which the requirements of the recent enactment of congress, with respect to the

* Qy. 960 admits of 27 divisions, not 19; 1,000 of 15 divisions, not 8. [True, when 1 is not reckoned as a divisor, which it need not be.—A. De M.]

Spanish coin, were complied with." This report adds, "The necessity of abolishing its use had been long felt by the people."]

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QUESTION.

24. In the retail transactions of the shop or market, is not division into halves, quarters, thirds, eighths, twelfths, &c. more convenient, and more in unison with the natural habits of mankind, than the division into tenths?

"The decimal numbers, applied to the French weights and measures, form one of its "highest theoretic excellences. It has, however, been proved by the most decisive "experience in France, that they are not adequate to the wants of man in society, "and, for all the purposes of retail trade, they have been formally abandoned. The "convenience of decimal arithmetic is in its nature merely a convenience of calcula- "tion; it belongs essentially to the keeping of accounts, but is merely an incident "to the transactions of trade. It is applied, therefore, with unquestionable advantage, "to monies of account, as we have done; yet, even in our application of it to the "*coins*, we have not only found it inadequate, but in some respects inconvenient. "The divisions of the Spanish dollar, as a coin, are not only into tenths, but into "halves, quarters, fifths, eights, sixteenths, and twentieths. We have the halves, "quarters, and twentieths, and might have the fifths, but the eighth makes a fraction "of the cent, and the sixteenth even a fraction of a mil. These eighths and six- "teenths form a very considerable proportion of our metallic currency; and although "the eighth, dividing the cent only into halves, adapts itself without inconvenience "to the system, the fraction of the sixteenth is not so tractable; and in its circulation, "as small change, it passes for six cents, though its value is six and a quarter, and "there is a loss by its circulatiou of four per cent. between the buyer and the seller. "For all the transactions of retail trade, the eighth and sixteenth of a dollar are "among the most useful and convenient of our coins; and, although we have never "coined them ourselves, we should have felt the want of them, if they had not been "supplied to us from the coinage of Spain."—QUINCY ADAMS'S *Report to Senate of United States*, 1821, p. 81.

ANSWER.

Mr. Quincy Adams wrote about France in 1821. In 1839 or 1840 the decimal system was fully established. The French committed the error of attempting to alter all at once, and in the middle of a revolution. In England the coinage will be altered *first*, and in quiet times, we may hope. Did the United States ever coin any binary coins? Was their use of the foreign coins anything but a mere want of coin?

QUESTION.

25. The late Lord Ashburton, in a debate in the House of Commons on this subject, remarked, "That the capacity of division by halves and quarters which attends our shillings is "extremely convenient for the common purposes of life, which upon the whole is the "best criterion of any system." Is this correct or otherwise?

How is the shilling expressed as 50 mils to be divided into quarters, or the sixpence expressed as 25 mils to be divided into halves?

ANSWER.

What does the sentence mean? What is *which?* Taking it to mean that *convenience*, and not *binary division*, is the criterion, I perfectly agree. Accordingly, I consider *all* the conveniences; and I find the conveniences of a decimal system preponderate greatly over those of our system. Lord Ashburton's argument looks like the following. Convenience is the criterion; binary division is convenient; therefore binary division is to be preferred. I reply as follows. The *balance* of convenience is the criterion; binary division, all points duly weighed, is not so convenient by a great deal as decimal division. Therefore decimal division is to be preferred.

Lord Ashburton's argument may be paralleled as follows. A table with chairs is more convenient than a table without chairs; therefore it is to be preferred. But what if an important *cæteris paribus* have been forgotten? What if the chairless table have dinner laid out on it, and the table with chairs be cheerless? A stand-up dinner is better than a sit-down fast, as may easily be ascertained by trial.

All debate, even in the highest quarters, reeks with the fallacy of urging disadvantages, instead of their balance. The questions before me are a laboured attempt to magnify certain alleged advantages of the common system, with the eyes steadily turned away from the over-weighing advantages of the decimal system.

QUESTION.

26. It is stated by Sir John Herschel, in his evidence before the Committee of the House of Commons, (qu. 594,) that in his opinion "it is a great misfortune that decimal coins will "never fit the fractions of a yard and of pounds and of measures." Must we concur in that opinion, and if so, must we concur in the further view of Sir John Herschel that, "a decimal system of weights and measures, as well as of coins, ought to form a "part of the same integral system?"

27. In the evidence given before the House of Commons' Committee, Sir John Herschel gives his opinion, that the decimalization of weights and measures and of coins should go hand in hand (qu. 598); but if that be impracticable, he inclines to the opinion that decimalization of weights and measures should be a step towards that of coinage (qu. 600).

Professor De Morgan would adopt a decimal coinage first, leaving the other (decimal weights and measures) for a future period (qu. 765).

Mr. Airy thinks that the adoption of a decimal system of weights and measures desirable to some extent, and probably concurrent with the binary system (qu. 481).

What is the correct view on those points? Is the adoption of a decimal system of weights and measures essential to the efficiency and usefulness of a decimal coinage? Ought it to precede, to accompany, or to follow, as a necessary consequence, the introduction of decimal coinage?

ANSWER.

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I know that Sir John Herschel and Mr. Airy both strongly advocate the proposed change in the coinage. I am as strongly as any one in favour of decimal weights and measures; but I affirm that nothing suits so well with a *varied* system of weights and measures as a decimal coinage. Consequently, I hold that a decimal system would suit our existing medley better than our existing system.

Two systems do not fit, unless their subdivisions are similar. Suppose we had,—

4 grains one drachm,	4 farthings one penny,
12 drachms one ounce,	12 pence one shilling,
20 ounces one pound,	20 shillings one pound.

Then a sovereign a pound is a shilling an ounce, a penny a drachm, a farthing a grain. But even then the want of decimal division is a great inconvenience. Thus at 1*l.* 3*s.* 4½*d.* a pound, how much do 14*oz.* 7*dr.* 3*gr.* cost? We here encounter a considerable fraction of our old difficulties. The truth is that next after complete decimal unity, the best thing is decimal coinage with *purely binary* weights and measures: a person new to the argument, must for some time halt between the two. The coinage is that on which far the greater quantity of the *work* takes place. But the maximum of facility is gained in a completely decimal system. The reasons why coinage should be decimalised first have been given already.

The Commissioners of Weights and Measures, whose opinion Mr. Airy, one of them, gives, changed their opinion on the subject by the time they made their *second* report. Speaking in 1854 of what they had said in 1841, they remark, "We wish to state our opinion that, in reference to "decimal scale generally, the public mind is very greatly changed; and that the introduction of a "decimal system will now be very easy in respect to many points which a few years ago would "have offered great difficulties." Sir John Herschel and Mr. Airy were parties to both reports.

The question to which I am now answering is only speculation. The advocates of the decimal coinage affirm that decimal coinage *alone* would be a very great benefit; and, though they are persuaded that decimal weights and measures will follow, they feel that the coinage question must be tried apart, and on its own separate merits. Not that they think it *ought* to be so, but because they are satisfied it *will* be so.

QUESTION.

28. Is it not the fact that, next to addition, the most important operation performed on numbers representing broken sums of money is the finding the price of a broken quantity of material when the price of a given unit of the material is a given broken sum?

Is not this operation in theory the multiplication of a broken quantity of material by a broken sum of money? Is it not usually performed, and with great facility, by the rule denominated "Practice?"

Is it not the fact that one of the great advantages of a completely decimal system of money, weights, and measures, would be that such operations would be performed by simple multiplication?

Is it not the fact that this result would not be attained unless weights and measures were decimalised as well as money?

If money alone were decimalised, would not such operations be still performed by "practice," and would the operations be much or at all simplified?

Take, for example, the following case, given by Sir Charles Pasley in his evidence before the Committee of the House of Commons, as showing the advantage of the decimal system.

215 tons 17 cwt. 3 qrs. 9 lbs. at £9 11*s.* 6¼*d.* a ton?

Under the present system we should say—

215 tons, 17 cwt., 3 qrs., 9 lbs.,

		£	*s.*	*d.*	
at £1 per ton	=	215	17	10	— $\frac{1}{28}$
at £8 „	=	1,727	2	8	— $\frac{8}{28}$
at 10*s.* = $\frac{1}{2}$	=	107	18	11	— $\frac{1}{56}$
1*s.* = $\frac{1}{10}$	=	10	15	10	$\frac{7}{10}$
6*d.* = $\frac{1}{2}$	=	5	7	11	$\frac{3}{10}$
¼*d.* = $\frac{1}{24}$	=	0	4	6	
at £9 11*s.* 6¼*d.*	=	£2,067	7	8½	

If weights and measures as well as coins were decimalised, the question might be:—Required the price of 483,597 lbs. at £4·275 per 1,000 lbs.? which would be a question of simple multiplication.

But if only coins were decimalised, then in the pound and mil system we should have 215 tons, 17 cwt. 3 qrs. 9 lbs. at £9·576 per ton, which we should probably work in the following manner:—

100 tons		=	957·600
100 „		=	957·600
10 „		=	95·760
5 „	= $\frac{1}{2}$	=	47·880
10 cwt.	= $\frac{1}{10}$	=	4·788
5 „	= $\frac{1}{2}$	=	2·394
1 „	= $\frac{1}{10}$	=	·478·8
1 „	= 1	=	·478·8
2 qrs.	= $\frac{1}{2}$	=	·239·4
1 „	= $\frac{1}{2}$	=	·119·7
7 lbs.	= $\frac{1}{4}$	=	·029·925
1 „	= $\frac{1}{7}$	=	·004·275
1 „	= $\frac{1}{7}$	=	·004·275
215 tons 17 cwt. 3 qrs. 9 lbs.		=	£2067·377

Is much or anything gained in this case *unless weights and measures as well as coins* are decimalised!

ANSWER.

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It *is* the fact that *next to addition, the most important operation performed on numbers representing* BROKEN *sums of money is the finding the price of a* BROKEN *quantity of material when the price of a given unit of the material is a given* BROKEN *sum.* And on this fact, as an anvil, I have been pounding the preceding questions. This fact is a fact of written calculation, and a higher fact of mental calculation; for as to things done in the head, we may leave out the words "*next to addition.*"

Now to the question. Would *practice* be simplified by decimal coinage applied to our common weights and measures? Yes, even if the proposer of the questions were allowed to dictate the mode of working; but more if there be a little more power of routine in ordinary arithmetic than he has supposed to be exerted. I shall first ask a few questions upon the practice question which he has worked in the common system, which I affirm to contain *concealed operations,* for which no figures are put down, of a character such as the ordinary arithmetician does not make without figures put down. And this is not the particular act of the proposer of the questions; such concealment is common even in books of arithmetic. In the common system a little paper bye-play is not infrequently supposed, a thing which is never needed in purely decimal calculation.

In the first line I see that at 1*l.* per ton 215 tons 17 cwt. is 215*l.* 17*s.*, but how am I to know that 3 qrs. 9 lbs. gives 10*d.* less $\frac{1}{28}d.$ The work is not much, but it is *out of routine.* This step would count as two lines of the work in the decimal example below to any but a very practised computer. The common run do not do such things without writing down. Again, in the line "$\frac{1}{4}d.$ is $\frac{1}{24}$" does the proposer mean that 24 is one of his *head divisors?* Has he not made a *tour de force* to save a line? 5*l.* 7*s.* is 107*s.*, having 24 four times and eleven over; eleven times 12 and 11 is 143, having six times 24 pretty nearly. Is 24 to be treated as a divisor in this way, by head-work alone? Then this is a strong argument in favour of decimal reckoning, whether as to facility or freedom from risk of error. Again, the imperfect fractional work by which the final halfpenny is determined, what does it tell? The answer has nearer to $\frac{3}{4}d.$ than to $\frac{1}{2}d.$ Which was meant, the *nearest* farthing, or the nearest *below?* Is the existing system always to be troubled with this extra fractional work? Then we have a still stronger argument for the decimal system, which treats fractions with the ease and after the manner of integers.

I shall now put down the decimal work; and as the preceding misses very nearly three-quarters of a farthing, I shall beat it by going to the nearest tenth of a mil. The power supposed to belong to the worker in the ordinary system contrasts strangely with the assumed feebleness of his opponent. The first can divide by 24 in one line; the second cannot grapple with the multiplication by 2, except by two lines and an addition.

	9·5760
200	1915·2000
10	95·7600
5	47·8800
10 cwt.	4·7880
5 „	2·3940
$2\frac{1}{2}$ „	1·1970
$\frac{1}{4}$ „	·1197
7 lbs.	·0299
1 „	·0043
1 „	·0043
	2067·3772

2067*l.* 3*fl.* 7*c.* 7*m.* and $\frac{1}{5}$ of a mil.

The number of *process* figures in the common way is 55, in spite of all its contractions of work. In the decimal process it is only 59 when we count fifteen ciphers which are needless, that is, 44 genuine process figures. As to the ease of the two processes, if any one of any amount of dexterity cannot find out for himself the vast difference between the two, it is needless to argue with him.

QUESTION.

29. Will not the introduction of a decimal system of coins and accounts necessarily tend to render the present system of weights and measures very inconvenient, and thus to force the country into the application of the decimal principle to weights and measures for the sake of necessary correspondence with the coinage?

"The concurrent use of non-decimal division of commodities with a decimal coinage "tends, in reckoning prices, to a result expressed in a binary fraction of a cent. In "such cases, if payment be made, three-fourths of a cent is liquidated with a cent; "a half-cent is sometimes paid the same way, sometimes not noticed. The quarter "cent is not liquidated. In accounts the three-quarters, halves, and fourths of a "cent are generally entered, and added in on footing the columns, the total being "carried to the cents, a fraction above half a cent being counted as a cent. It is "believed that no sensible loss to either party arises in the long run from this "practice. Even in a complete decimal system of weights, measures, and coins it "would be impossible to liquidate accurately all reckonings, unless the least coin "were smaller than the public would endure."—Answer to No. 36 of Circular Queries, by J. Ross SNOWDEN, Director of the Mint of the United States.

ANSWER.

The quotation is not much to the point and may be neglected. As to the question, I believe the country will be *forced* into decimal weights and measures by a deep conviction of their advantage, so soon as it shall have experienced the benefits of a decimal coinage. And what then? was not the world *forced* into the sub-marine telegraph by experience of the advantages of the land telegraph? and what harm has come of it? Good things which force other good things are good good things.

It is possible that the demand for decimal measures may not be so rapid nor so urgent as I anticipate. Decimal coinage will be so great a relief, that people may be more sensible of what they have gained than of what they may still gain. It is not with all things as with money, of which the desire of gain often grows with the gain. In matters of comfort a great accession may produce a disposition to retire upon a competency. But I hope better things.

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QUESTION.

30. A great practical authority, Mr. Slater, has stated that one consequence of the introduction of decimal coinage will be, that articles will be made up in parcels of ten each instead of dozens as at present. Will not this be less convenient for subdivision than the present practice of making up articles in dozens?

ANSWER.

Mr. Slater is quite right, and consequently several of the preceding questions need no other answer than is contained in his assertion. Speaking of mere package, what harm will result from 10 not subdividing as much as 12. Customers will be just as apt to buy tens as tradesmen to pack them. In fact, Mr. Slater founds his opinion on his perception of both buyers and sellers finding their account in packing by tens. And when a tradesman unpacks a parcel of ten to sell six to his customer, if six be asked for, he will not feel hurt because his customer did not ask for *five*. Nay, if the customer should want a dozen, the tradesman will cheerfully unpack a second parcel. Nobody has so keen a feeling that every little helps as the man who stands behind a counter all day: nobody has so clear a notion that gaining a farthing is better than standing idle.

QUESTION.

31. Does not the anticipation of the change in this respect afford a practical illustration of the tendency of a decimal coinage to force the country into the adoption of decimal weights and measures?

ANSWER.

It does, and so much the better. The force is force of conviction, and is not the force of class upon class, but the force of man's experience upon himself. It is the force upon which the French merchants relied for propulsion, when to Colbert's question what he could do for commerce they answered, Let it alone.

QUESTION.

32. Is not this an inversion of the natural and proper course? Ought not the country to decide in the first instance what system is most properly applicable to weights and measures, and then proceed to adjust coinage and accounts to that system, coins and accounts being the means for adjusting and registering the retail payments which arise out of transactions which have had their origin in weights and measures?

ANSWER.

No, it is the natural and proper course; at least it is the proper course, whether natural or not. Man's nature is very apt to induce him to suppose himself an omniscient judge of the future: here nature and propriety are at war. The proper course, the course which experience tells us has produced the best results, the course to which this country is given beyond all others, and by which it has thriven beyond all others, is to make changes slowly, to make the smallest changes first, to correct the omniscience of man's nature by watching the effect of changes, and to take what can be safely got as fast as it can be safely got.

QUESTION.

33. The Select Committee of Parliament of 1821 recommended that the subdivision of weights and measures employed in this country be retained, as being far better adapted to common practical purposes than the decimal scale. If this recommendation be founded on sound reason, is it not equally applicable to the case of coinage as it it is to weights and measures? Is it not fully as true of coins as it is of weights and measures, that the present subdivision of them is well adapted to all common practical purposes?

See Evidence of J. E. Gray, Esq. (qu. 378.)

Dr. Peacock, speaking of the introduction of the French metrical system, says, Encycl. Metrop. Art. Arithmetic, p. 448:—"The decimal subdivision of these measures "possessed many advantages on the score of uniformity, and was calculated to simplify "in a very extraordinary degree the arithmetic of concrete quantities. It was attended, "however, by the sacrifice of all the practical advantages which attend subdivisions by "a scale admitting of more than one bisection, which was the case with those previously "in use, and it may well be doubted whether the loss in this respect was not more "than a compensation for every other gain." Must we admit the weight of this authority and the conclusion to which it leads?

ANSWER.

The parliamentary history of the country is well studded—thank God— with neglect of the recommendations of select committees. How strong the select committees used to be on the corn laws! The *if* is highly important. But even if—though I deny it—the opinion as to weights and measures be sound, there are ample reasons for decimalising the coinage.

I pay great deference to Dr. Peacock's authority, because he is one of the few to whom the history of mercantile arithmetic in all time is a familiar subject. But I pay more deference to Dr. Peacock of 1857 than to Dr. Peacock of 1826, (though he was then one of my teachers,) and Dr. Peacock himself does the same. He is a warm advocate of the pound and mil system, and is a member of the Council of the Decimal Association. The men of science generally, who had a leaning towards binary measures in conjunction with decimal coinage, are gradually becoming more in favour of complete decimalisation.

Dr. Peacock was one of the commissioners who in 1854 reported that many of the difficulties of decimalizing weights and measures had disappeared.

IV.

QUESTION.

34. Is it not the fact that in all matters of abstract number and multiplication of material things there appears to be a general instinctive tendency to adopt the decimal system, whilst in dealing with material subdivision, whether in length, capacity, or weight, there is an equally strong tendency to adopt the binary system,—the decimal

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system in arithmetical calculation, the binary system in weights and measutes, and the retail transactions of the market arising out of them? Are not all the integers of our weights and measures multiplied decimally, but divided by the binary scale? Do we not speak of ten yards, a hundred yards, a thousand yards? But when we come to *subdivide* the yard, do we not think and speak of half a yard, quarter of a yard, &c., and similarly in all other cases?

"The earliest and most venerable of historical records extant, in perfect coincidence "with speculative theory, prove that decimal arithmetic, as founded in nature, is "peculiarly applicable to the standard *units* of weights and measures, but not to "their subdivisions or fractional parts, nor to the objects of their admeasurement or "weights."—QUINCY ADAMS'S *Report to Senate of United States*, 1821, p. 16.

35. Is it not then natural and convenient that our integer of money, the £ sterling, should be similarly treated? That whilst we speak of ten pounds, one hundred pounds, one thousand pounds, we should *subdivide* the £ sterling into half a pound, or 10*s.*; a quarter of a £ or 5*s.*? And, again that we should subdivide a shilling into half a shilling or 6*d.*; a quarter of a shilling or 3*d.*, and so on?—thus applying decimal arithmetic to the standard unit of our coinage, the £ sterling, but not to its subdivisions or fractional parts.

ANSWER.

We have nothing to do with the natural man and his instinctive tendencies. It is perfectly clear from history that the instinctive tendency of man is to take of his neighbour's goods without equivalent *as much* as he wants; and this I take to be the earliest *measure* on record. The best thing that can be said for the creature's original practices, is that sometimes he did *not* burn the rest, after he had supplied himself by his own mode of measuring. Laws are constantly fighting against instinctive tendencies, if that be the proper name.

The instinctive tendency of infants is to *crawl*. If a generation of infants could grow up without the care of adults, it is much to be feared that the bulk of mankind would crawl for generation after generation. And when some bold men at last proposed that infants should be taught to walk, select committees would laugh at the idea on their hands and knees, and long papers of questions would magnify and diversify the dangers of tumbling, and would appeal to our instincts. Habits are no argument in questions of improvement. Let a system be ever so bad, people will acquire some mitigating habits: but such habits must not be urged against improvement.

The convenience of the binary division is the same sort of convenience as that of reckoning by pebbles, or by the chequer board and abacus. Advancing intelligence has driven out the pebbles from which *calculation* takes its name, and the bungling board from which the *exchequer* takes its name; and it will also drive out binary division. Mankind are far enough advanced to make a good shift without it, and the good shift would soon become perfect dexterity. But let them not take this on authority: introduce decimal coinage, and they will know it soon enough as to measures.

The notion that man instinctively goes upwards by ten and downwards by two is unsupported by fact. The unit of commencement is the unit best adapted to our grasp. Thus, in measuring land the pole of convenient length for two men to carry and lay along was used, and *forty* poles make a furlong. Measures and weights go up and down from a convenient unit, with combinations of various kinds both ways.

There is very little instinctive arithmetic. None but those who have studied the history of number can be aware of the excessive slowness of the ruder periods at comprehension of numbers. Again, natural instincts in science were never towards simplicity: simplicity is an advanced product of art.

QUESTION.

36. In the Report of the Legislative Assembly of Canada on Decimal Currency (p. 14) is the following statement:—

"The decimal currency admits of but one aliquot division—into halves; but the New "York shilling, an eighth of a dollar, can be divided into sixths, quarters, thirds, "halves, &c., and although Congress has never coined any shillings, the American "people during sixty years have clung to their well-worn shillings and sixpences, "perceiving them to be a great public convenience. Your Committee are of "opinion that coins representing the eighth and sixteenth of a dollar are indis-"pensable in small transactions in Canada, and that the smooth British sixpences "will continue to pass extensively as the eighth of a dollar unless a better coinage "is provided."

In a communication from the Rev. Joshua Leavitt of New York (p. 48 of the same Report), this further remark occurs:—

"I have no doubt of the superiority of the decimal system for the purposes of accounts, and "am astonished that other countries have so long delayed its adoption. Our experience "of the benefit of our federal currency in this respect is all one way. The saving of "time and labour is prodigious, and the advantage in point of correctness and of the "facility of detecting errors unquestionable. But for the purposes of small circulation, "in marketing, huckstering, and the like, I am persuaded that a duodecimal currency "like that of England, or like that which formerly prevailed in the city of New York, "is far preferable. These small transactions of daily life outnumber the transactions of "commerce almost infinitely. And it seems impossible to make a decimal currency as "convenient in these as the old currency. One reason is, that the decimal currency "admits of only one aliquot division, that is, into halves. The shilling can be divided "into halves, quarters, thirds, sixths, and twelfths; and if it were needed, a coin of the "value of two thirds of a shilling would be found manageable. In all these countless "small transactions which I have referred to, and in which every man is employed many "times every day, this capability of subdivision is of great convenience. We are con-"stantly buying a half of a thing, or a quarter, the eighth, the one-third, and so on. If "the price is a dollar, we can make the change for one-half, for one-quarter, and if one,

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"two, or more pence, with our decimal currency, but we cannot pay the exact price of "one-third, one-sixth, one-eighth, one-twelfth, or any other of the fractional parts. If "the price is half a dollar, we can only pay for one-half, one-fifth, and one-tenth. If "the price is a quarter of a dollar, we can pay for no aliquot division whatever. This "is a constant inconvenience, and can be got along with in no other way than by "*disregarding small differences.*"

If a decimal coinage be introduced into this country, is there any reason to suppose that the inconveniences here stated as the result of practical experience in the United States will not equally occur in this country?

Will it be possible to obtain the eighth or the sixteenth of a florin, or the quarter of a shilling, or the half of a sixpence, under the proposed decimal system?

If the *small differences*, necessarily arising from this imperfect divisibility of the decimal coins, must be *disregarded*, upon whom will the unavoidable loss fall?

With the tradesman will it not be an accumulating loss, consuming his profits; and will it not be impossible therefore for him to bear it?

Must it not therefore necessarily fall upon the small purchaser?

The principle of the objection is, that the decimal system substitutes the divisors 2 and 5 for the divisors 2, 3, 4, 8, 12, 16, which are the natural divisors for material things, and are also the divisors of our present money, giving us the third, fourth, and half parts of every thing.

That the effect of this will be, in the sale of broken parcels of commodities, a small money remainder involving loss to shopkeeper or customer.

This, we see, is a source of constant inconvenience in the United States.

Let us take the descending steps from 8*s.*

8*s.*, or 400 mils, or 4 florins, is not divisible by 32, the divisor of $\frac{1}{2}$ oz.

4*s.*, or 200 mils, or 2 florins, is not divisible by 16, the divisor of 1 oz.

2*s.*, or 100 mils, or 1 florin, is not divisible by 8, the divisor of 2 oz.

1*s.*, or 50 mils, or $\frac{1}{2}$ florin, is not divisible by 4, the divisor of $\frac{1}{4}$ lb.

6*d.*, or 25 mils, is not divisible by 2, the divisor of $\frac{1}{2}$ lb.

In each of these cases, in the purchase of a broken quantity of material, $\frac{1}{2}$ oz., 1 oz., $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., will there not necessarily arise a broken sum of money, which cannot be paid in any coin; a small "difference which must be disregarded," to the loss of buyer or seller?

Mark how under a denimal coinage the difficulty occurs in an earlier stage, and in a more serious form, than under the present coinage, precisely as we descend to the lower amounts, to those which are the usual prevalent prices with the middle and lower classes.

If it be assumed that, instead of these prices, "competition will determine prices in decimals "conveniently divisible by 2, 4, 8, or 16," and therefore in prices not corresponding to the decimal money of account; if instead of one shilling, or 50 mils, the price of the unit of the material is taken at 48 mils, is not this in itself an admission that in introducing decimal money we shall have introduced a money not conveniently adapted to the purposes of the market?

And in so doing shall we not have incurred a new set of objections, namely, the inconvenience of being obliged to use several coins with which to pay the 48 mils, instead of one coin with which 50 mils may be paid?

37. Again: Mr. Leavitt bears testimony to the admirable qualities of the decimal currency for accounts, but asserts that for small circulation and payments in marketing, huckstering, and the like, a duodecimal coinage is also wanted and preferable to the other. These small transactions of daily life far out-number the dealings of commerce. And this statement is sanctioned by the concurrence of the Committee of the Legislative Assembly of Canada.

Does not this statement distinctly point to the necessity of abandoning a duodecimal system of coinage, but of introducing, if possible, in connection with our present system of coins, some means by which money transactions may be recorded in a decimal system of notation, thus retaining the present system of coins undisturbed, but combining with it a decimal system of reckoning or account keeping?

"Perhaps it may be found by more protracted and multiplied experience that the same "material instruments shall be divisible decimally for calculations and accounts; but in any "other manner suited to convenience in the shops and markets; that their appropriate "legal denominations shall be used for computations, and the trivial (or customary) names "for actual weight and mensuration."—Quincy Adams's *Report*, p. 90.

ANSWER.

These questions ring the changes on matters already discussed. I refer again to *broken prices* and broken quantities. The fraction of a farthing is constantly occurring in the purchases of the poorer classes, who, as was proved before the Committee of the House of Commons, become "keen calculators" in determining how these fractions affect them. The poor have already been trained upon a hard system of small capability. It is proposed to give them one in which less trouble will produce skill capable of further direction.

If it should become customary to price ounces in mils, instead of pounds averdupois in shillings or florins, this will only prove that there is a great convenience in dealing with a low unit multiplied, instead of a high unit subdivided, and allowing the higher units of coin to come in merely as the ten, hundred, &c., of the lowest unit. These higher units *make themselves* in language and in thought, instead of requiring to be made by an act of calculation. Broken prices work more easily in a decimal *subdivision;* and if people find that they work more easily still in a decimal *aggregation*, we can only say why not? Ought subdivisions which work *more easily* with broken sums than the present ones to be refused, for fear it should be found out that by reversing the process, and working upwards from the lowest unit, the matter would be made *more easy still?*

The convenience of paying or receiving a coin more or less seems to me greatly overrated. And the question entirely forgets that people give change. If 48 mils a pound become common, then, in the few cases, comparatively speaking, in which the exact pound would have been a shilling, a shilling would be paid in, and two mils given back.

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QUESTION.

38. Are not the following the primary requirements of a good system of coinage? viz.:—

1st. That the integer should be divisible into the greatest number of clean fractional parts to correspond with the endless variety of retail transactions which they are to be the means of adjusting:

2nd. That these fractional parts should be expressible in the shortest and most simple form of words, and with the smallest number of figures:

3rd. That the coins should be such, both in denomination and relative value, as may pass with the greatest facility in valuing or summing them up when presented in great numbers:

4th. That they should be such as may afford the greatest facility for mental conception, for recollection, and for the ordinary processes of arithmetic which the people are daily called upon to perform mentally in the tumult of the market or shop, and without the opportunity of recording them in writing:

5th. That they should harmonize with the natural tendency of mankind to subdivide commodities for retail purposes by continual halving.

ANSWER.

1. For adjustment substitute calculation, or, at least, introduce the idea. If division without remainder be *clean*, then I suppose division with remainder over is *dirty*. These words being agreed on, those computations which are clean at 1*s.* a pound, become very dirty at $7\frac{1}{4}d.$ a pound. We want much easier ways of dealing with the lowest coins: the decimal system supplies this want.

2. The common people have little to do with the technicalities of fractional expression; and if they had, the forms of decimal fractions are more easy, and more easily convertible than those of common fractions.

3. This is indeed a primary requirement, and one great point of the decimal system is the facility of *valuing and summing up* when the coins go by tens in agreement with the system of numeration.

4. The decimal system distances the common system completely on broken prices, and broken prices are the rule of the market.

5. The facilities of the decimal system outweigh the advantage of binary division of coins.

These questions are mere repetitions, and I refer on them to all the answers preceding.

QUESTION.

39. Is not the following a just description of the present system?

In the ultimate subdivision, where the binary division is alone useful, we have two binary steps, viz., two farthings = 1 halfpenny, two halfpence = 1 penny. In rising to the next unit, the shilling, we have again the factor 2 introduced twice, giving four 2*s.* besides the number which, next to 2, is most frequently required as a divisor, viz., 3. In rising to the next unit, the £1, we have again the factor 2 introduced twice, giving six 2*s.* besides the prime number which, next to 2 and 3 and their products, is most frequently required as a divisor, viz., 5.

Thus giving the following table of the factors of the number of each of our present units contained in the superior units.

Farthing.	2 × 2	2 × 2 × 2 × 2 × 3	2 × 2 × 2 × 2 × 3 × 2 × 2 × 5
	Penny.	2 × 2 × 3	2 × 2 × 3 × 2 × 2 × 5
		Shilling.	2 × 2 × 5
			Pound.

Does not this system fulfil to a greater degree than any other possible system some of the above requirements? Can this system be justly considered as accidental or unscientific?

There must have been some valid reason for the adoption and long retention of our present peculiar system of coins instead of the obvious plan of making the progression of coins correspond to the progression of figures according to our Arabic notation.

What is that reason? Is it to be found in the above explanation, and in the varied and infinite divisibility of the integer obtained through this system?

ANSWER.

A true account is given of the factors which the common system contains. But it does not fulfil the requirements of a system of coinage so well as the decimal system; and that by a very great deal. To this point the whole of the questions go, and the whole of the answers. It is neither accidental, nor wholly unscientific for its day. But our affair is with its comparative, not its absolute merit.

The dozen was derived from the Romans, who divided all wholes into twelve parts. Of all the nations of antiquity they were the most unskilful in calculation, and they had a decimal numeration so defaced in its mode of expression, that they were driven to the abacus for very ordinary calculations. The Roman dozen is seen in the division of the pound troy, which is 12 ounces. How the 20 was introduced at the next step, or how the 12 and 20 changed places in the pound of coined money, I have never seen explained. The 20, fortunately for us, was an abandonment of the Roman dozen. To be consistent, the advocates of the present system should try still further to duodecimalise the pound, by making it 12 shillings. But I believe no one has carried his love of duodecimalism so far.

As to valid reason for long retention, when in England was any reason except usage required for retention? The progression of coin could not have been fitted to Arabic notation, because our

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coinage was settled long before the introduction of Arabic numerals and reckoning. The awkward Roman mode of expression, with its mixture of *quinquagesimalism* and *expression by subtraction*, half hid the decimal principle. It is not so very long since accounts were kept in Roman numerals at the Exchequer. The spiteful tallies which burnt down the Houses of Parliament because they were turned out of office had Roman numerals on them to the very last. In old books of arithmetic, the numerals 1, 2, 3, 4, &c., are often explained by i, ii, iii, iv, &c., which were supposed known to the young arithmetician at starting. In an old work on book-keeping now before me (Mellis, 1588) all the statements of money are in Roman numerals, which are made Arabic in the working columns. And this was common enough.

QUESTION.

40. Does it not necessarily follow that a system of coinage based upon a binary or duodecimal scale must answer these requirements more completely than a decimal coinage, seeing that 12 is divisible by more factors than 10, and that the quotients of such division are again more divisible under the present than under a decimal system? And does not our present coinage afford *peculiar* facilities for continued division into clean fractional parts?

ANSWER.

Yes: I mean it does *not* necessarily follow. The greatest requirement of all, easy valuing and measuring, is infinitely better obtained in the decimal system. And the clean fractional parts of the shilling—again I answer, because again I am asked—are useless in broken prices.

QUESTION.

41. If in place of our present division of the £ sterling, a decimal division be substituted, shall we not in many cases lose the power of obtaining an exact result?
What is the 3rd, the 6th, the 12th, or the 16th part of a £ sterling under decimal division of the coinage?
Under our present system it is exactly 6*s.* 8*d.*, 3*s.* 4*d.*, 1*s.* 8*d.*, 1*s.* 3*d.*
Again, what is the 3rd, 6th, 12th, and 16th part of a shilling in decimal coinage?
Under our present system it is exactly 4*d.*, 2*d.*, 1*d.*, 3 farthings.

ANSWER.

This question has been answered again and again; that is, the objection implied in it against decimal coinage.

V.

QUESTION.

42. If it be admitted that for all ordinary retail transactions, for the purposes generally of paying and receiving, our present coinage is satisfactory, whilst the inconvenience is found to arise when we come to processes of account-keeping and calculation, does it not follow that our present coins ought if possible to be retained without any change, that some decimal system of *recording* the various sums should be introduced, and that we should decimalize our *accounts*, retaining our present *coinage* in all respects unchanged?—See No. 37.

ANSWER.

It is *not* admitted that our present coinage is satisfactory for paying and receiving, because a very important element of this process is the way of arriving at the knowledge of *what* to pay or receive. The inconvenience is universal: it is not confined to the higher and more elaborate paper-ruling, item-describing, and figure-writing process which is called *accounts*. The inconvenience is comparatively greater in what the questions call *adjustments* than in the grander processes which they call *calculations*. The easier the thing ought to be, and might be, the harder, *comparatively*, does the common system make it.

If we decimalise *accounts*, retaining all our *coins* unchanged, we should make our system worse than it is already, if people would use the new system; but they would not.

QUESTION.

43. How far will this be accomplished by writing down all money values in the number of pence of which they consist, *ex. gr.*:—

£	*s.*	*d.*		Pence.		Mils.
1	0	0	=	240	=	1,000
0	6	8	=	80	=	333·333
0	5	0	=	60	=	250
0	3	4	=	40	=	166·666
0	2	6	=	30	=	125
0	1	3	=	15	=	62·5
1	18	9		465		1,937·499

See the following answer to No. 37 of the Circular Queries by J. Ross Snowden, Esq.:—

"*A.* The scope of this inquiry may admit of the suggestion, that if the decimalisation of "the British coinage were effected by adopting, in place of the pound sterling, a new "unit of the value of one hundred of the present divisions of the pound (say 100 "farthings, halfpence, or pence) all prices and coins under the present system would "be exactly measured in the new unit and its parts, which would also be almost exactly "commensurable with the dollar of the United States. A unit of 100 halfpence, for "example, which might be called a dollar, would be equal to $1·013 of the United "States, an approximation to our unit so close, that the moneys of the two countries, "under such a system, might be deemed substantially identical."

ANSWER.

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This is a new question. Let us see how a system of recording in pence would act in a banking house, our existing coinage being the means of receipt and payment. There would be a constant bringing in and paying out of mixed pounds, shillings, and pence. In the hurry of the first entry it is impossible that the clerks should convert into pence as they go on. The first entries then must be *£ s. d.* Now surely the original entries must be checked, and the day's work must be balanced on the first entries. Consequently, addition in the common way must be done. What then is the boon conferred upon the banking world? Permission to multiply by 12 and 20 before each ledger entry, for the satisfaction of playing at decimal addition of pence in the ledger. This will be, *on the whole*, more trouble and risk of error than the common method. The public will lose the advantage of decimals in business and in education. The banker will have more trouble, that is, more expense, for his clerks have their hands full as it is; so that more trouble means more people to take trouble. And all this refers to the merchant as much as to the banker.

I believe the following to be a true account of the *principle*, though an exaggerated account of the detail, of keeping books in pence, while receipts and payments are in pounds, shillings, and pence. Blocks of stone are to be carted. Break them up into pebbles, because it is easier to shovel in pebbles than to crane in blocks. Never mind the double process of breaking up and shovelling amounting to much more trouble than lifting in. Convey the pebbles to their destination, and when they are wanted to build with join them into blocks again.

Thus with 543*l.* 11*s.* 9*d.* paid in and drawn out by cheque. We have as follows:—

The way into the ledger.

543—11—9
20
10871
12
130461

The way out of the ledger.

12)130461
20)10871—9
543—11—9

This is done to save the trouble of adding in the ordinary way. Now, though ordinary addition is a troublesome thing, with its twelve and twenty work at the *bottom of each column*, as compared with decimal addition, it does not mend the matter at all to introduce *twelve and twenty work* into *every item all down the column*. The plan seems to me to imitate the folly of the child who takes the medicine by sips, because the taste is nasty, instead of getting over it by one good gulp at once, with one taste for all.

There is no fear of any movement in favour of this system. No one ventured to back it in the debate which produced the Royal Commission.

QUESTION.

44. Does not every decimal system of accounts necessarily consist in taking the lowest money unit, and stating in Arabic notation the cumulative amount of that coin contained in any given sum.

45. In the £ and mil scheme do we not take the farthing (*changed in its value* and called a mil) as the basis of the system, and then proceed to state all values in the number of these new farthings contained in that value?*

In the penny scheme do we not take, in a similar manner, the penny as the basis, but *without any change in its value?*

In addition to this advantage, will not the statement of values by the number of pence contained in them, rather than by the number of farthings or mils, necessarily involve greater conciseness and simplicity of expression, there being only one fourth the number of pence as compared with the number of farthings in any value?

Is it not an advantage in any decimal system that it does not necessarily involve the introduction of a farthing column into all accounts, seeing that all sums under a penny are now voluntarily omitted from a sense of convenience in a very large proportion of accounts?

In those cases in which it is found desirable to introduce fractions of a penny, is there not reason to believe that it will be found more convenient to express those fractions binarily than in a decimal form, seeing that such has been the result of practical experience in the United States?

The Director of the Mint states (qu. 31), "The change has been effectual as to the use of "dollars and cents, but not of the mil, the fraction of a cent being expressed binarily."

ANSWER.

To question 44, No. To both together as follows: The words *necessarily consist* are meant to imply that the question gives us the whole. It does not give us the whole. Legs are essential to a table; but a table does not *consist of* legs.

Undoubtedly, so far as the routine of written calculation is concerned, a decimal system of accounts is created so soon as a unit coin is chosen, and it is agreed to reckon 1, 2, 3,.....10, 11, ...100, 101, ... of those coins. The fallacy of the question consists in leaving out of accounts every notion except that of numeration.

Besides numeration, there is distinctness of conception, there is facility of recollection, there is mental calculation. All these things are recognised by the defenders of the existing system, because the existing system does, in its way, provide for them. Accordingly, the question which I am now answering is very satirical upon the penny scheme. It says in effect, "We are now come to a plan which requires us to strip accounts of all the adjuncts of conception, recollection, mental computation, &c., and to reduce them to pure numeration." And thus reading question 44, to which I at first answered, No, I now answer: Yes, if you mean the penny scheme; for the words "consist in" are very just and fully descriptive.

* Keeping accounts in farthings reduced 4 per cent. in value, as stated by Dr. Gray (385)

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When Dr. Gray described the pound and mil system as reckoning by farthings reduced four per cent., he reduced that scheme to the baldness of his own. Both the existing system and the pound and mil system are superior to the penny system in the following points :—

1. They both aid facility of conception by having coin for every money of account. The 4, the 48, the 960, of the lowest coin; the 10, the 100, the 1000, of the lowest coin, are *names* and *tangible things*. The penny system deals in 10, 100, &c., of its lowest coins without names or things. At some distant period, according to its proposers, we are to have tenpenny coins, introduced gradually, to work confusion among the shillings.

2. They both aid *recollection* in the same way, and therefore *mental calculation*, which is common calculation with common memory substituted for paper memory.

3. They both contain the pound and shilling as a matter of distinct conception.

QUESTION.

46. If the penny be taken as the lowest unit of a decimal system of accounts, and if all sums be written down in the number of pence of which they consist, will not this afford a decimal system of accounts which may be used in conjunction with and without involving any disturbance of our existing system of coinage, or changing the character of the £ sterling as the great unit of account, as the basis of our system of exchange with all the world, and as the great integer by which all our principal calculations and estimates of property and of obligations are made?

ANSWER.

The penny system will not disturb our system of coinage; but, if not prevented by our system of coinage from coming into existence, which I am confident will be the case, our system of coinage will wofully disturb the penny system.

QUESTION.

47. The fractions of a penny would be written as fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. Is this a disadvantage? Is it not the case, that practically in all countries, even in those in which the decimal system is most completely carried out, the ultimate subdivision of coins is binary? Is not this shown by the fact that in France, Portugal, &c., the 5-centime piece and the 5-rei piece are the lowest coins in general use or generally expressed in accounts? In the United States is not a $\frac{1}{2}$ cent universally expressed instead of 5 mils? What is the inconvenience of writing such values as fractions? Are they not as easily added in this as in a decimal form, and are they not more easily multiplied?

ANSWER.

The mere halving of the lowest coin is no disadvantage. It can be done in a decimal system, and it will be done when convenient; nothing proposed in the question is either impossible to decimalists, or repudiated by them. But it is an abiding delusion of the opponent of decimals that he will suppose the decimalist to be under contract never to use a common fraction.

The language of some advocates of decimals is calculated to foster this delusion: their phrases would almost make one think that decimals are upheld as *ethically* right rather than as *technically* convenient. This is always the case in discussion; matters of practice become matters of doctrine on both sides. So on one side we sometimes find a morbid exclusion of the common fraction, and on the other side we hear the taunt, You are departing from the decimal *principle*. For myself, I care not one mil for the decimal *principle*, and the manner in which I look on the subject of common fractions as related to decimal convenience—for which I do care—is as follows :—

I exclude *common fractions*, binary or not, from the coins which are to be the units of the main working system, because by admitting them *decimal arithmetic* would be crippled in its details, and its distinctive utility would be destroyed. Decimal arithmetic *deals with fractions as with integers*, and thence derives its peculiar advantage. Thus $1\frac{72}{100}$, 1 and 72 hundredths, is truly 172 for all *working* purposes. For purposes of appreciation and perception it is marked 1·72 or otherwise in order that 172 of one sort may not be confounded with 172 of another. Hence the great practical advantage of decimal working: *fractions undistinguishable in operation from integers*. When once this great field of facility is fairly reduced into possession, which it never will be if common fractions are intruded of necessity into fundamental operations, it is then open to the calculator to learn the manner in which common fractions are to be made useful in all the cases in which they *can* be made useful. And assuredly, a decimal system, well and truly learnt, would be a basis on which common fractions would find uses from which they are now excluded. The decimally educated arithmetician would acquire that power of perception over his *units*, and that freedom from the mysterious notion of *the* unit, which he never can acquire, at least which he very seldom *does* acquire, in a system the units of which are railed off from one another by complex multiplications and divisions. I would ask the advocates of the present system why we hardly ever, if ever, see such quotations as £4½, £12¾, 2¼*s.*, &c. By the true answer hangs a tale which does not tell well for the existing system. In the question which I am now answering we have the advocate for a certain decimal system pleading for binary division of his lowest banker's coin. I tell him in reply that if he will only keep binary division in its place, and not spoil arithmetic by it, he shall have a system in which not merely the lowest unit, but every unit, shall be the frequent object of binary division, and non-binary division also, to an extent undreamed of by the operator on quarto-duodecimo-vicesimal difficulty of transformation. One great advantage of decimals is that common fractions are instruments of greater power. Try 72-193rds of 63*l.* 11*s.* 9*d.* and of 63*l.* 5*fl.* 8*ct.* 7*m.*

The person who mixes common fractions with decimals, as fundamental ingredients, may be likened to a tradesman who has sticks of something sold by weight tied up in dozens, and who tries to sell part of a parcel by cutting off the lower ends of all the sticks. Common sense would tell him to untie the packet which had been tied up, and to take out as many whole sticks as he might want. This should be his *principle*. But if a case should arise in which it is more convenient to chop off one end of all the sticks, nothing hinders. And still less does anything hinder him from breaking a single stick to make up weight. Let decimals keep their place, and let common fractions keep their place: the load will then be lightened to the utmost. As the old philosophers used to say, Nothing gravitates *in proprio loco*.

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QUESTION.

48. This system would not include fractions of the penny otherwise than as fractions. Is it desirable to incur the inconveniences of the £ and mil scheme, the abolition of our present copper coinage, the abandonment especially of the penny, &c., for the purpose of comprehending in a decimal system of notation and account-keeping the fractions of a penny, which under the present system are so seldom required, which, when required can be so easily expressed as fractions, and which are in so many cases voluntarily omitted for the sake of convenience?

ANSWER.

If this question be asked as between the pound and mil system and the common system, it is a general question, already answered in detail. If it refer exclusively to the penny system, it is only necessary to note that the decimal system is not intended only for what the questioner calls *accounts*. The penny system excludes the world at large from decimals: even supposing that bankers, &c., would adopt it—a strong supposition—*the common people must and will reckon in the coins they use.*

QUESTION.

49. If the decimal system is to be tried for the sake of simplicity and convenience in account-keeping and calculation, is it not the most prudent and safe course to make the trial of it, in the first instance at least, as a system of account only, without disturbing the coinage?

How far would this be accomplished by simply authorizing the expression of all sums of money in the number of pence of which they consist?

ANSWER.

The decimal system is not to be *taken on trial:* it is a demonstrated improvement or it is nothing. Who, in England, would propose to alter a coinage or a Parliament on trial? What decimalist ever recommended the system in no higher character than as looking so promising that it deserved a trial? If any persons were to propose to aggregate themselves to the decimal association on condition that that body should only move for a trial, they would, though I am not sure about the wording, receive the advice which King David gave to his servants, namely, to tarry at Jericho until their beards were grown.

Further, this question again supposes that the decimal system is proposed only for its advantages in "account-keeping and calculation," by which the proposer always means large transactions as opposed to smaller ones, which he calls *adjustments*. But it is, in fact, proposed and supported also for its advantages in education, and for the convenience which it introduces into the little calculations of the poor. For example, I, who now answer these questions, and who did what I could to call public attention to the subject long before the agitation commenced, would never have troubled myself about it if its advantages had been confined to merchants and bankers; I should have left those classes to take care of themselves. But as a teacher, I saw the quantity of time which the common system takes, and I saw also the very imperfect results which it produces. As a teacher, I found that it was shorter and easier, with tolerably educated pupils, to turn into decimals, to work in them, and to translate the answer back into common denominations, than to use the ordinary processes; and I took up the subject for the benefit of those who have little time for education.

The penny system introduces no decimal system into the world at large, which *must* always calculate in the coins it uses. I believe the commercial world *will* do the same.

VI.

QUESTION.

50. If the decimal system of coinage recommended by the Committee of the House of Commons (£ and mil scheme) be adopted, will it not necessarily involve the introduction of more than two monies of account?

Will not this necessarily give rise to difficulty, trouble, and confusion?

51. Is there any country with a decimal coinage in which more than two monies of account are now in practical use?

ANSWER.

The question 51 as originally proposed had not the words "with a decimal coinage" in it, and the answer was as follows.

By money of account in these questions must be meant monies below the *highest* unit of account. The answer to question 51 is—Yes Great Britain, not to mention Portugal and Brazil, with the MILREA of 1000 REAS. Therefore we have three lower monies of account, shillings, pence, and farthings. In *addition-trouble*, shillings count as two, for the second column of shillings *is* a column, and though easy, is a *very* unsafe column. The banker rejects farthings, but the tradesman, the tax-gatherer, the savings' banks, &c., do no such thing. When the pound and mil system is established the bank will reject mils. Talk as he may now, the banker* is a sensible man at figures, and he knows that $2\frac{1}{2}d.$—less four per cent. to be quite accurate—is nothing in cheque drawing. And he will be very glad to be rid of all dealing in copper. So that the banker who has now three lower moneys of account, *counting the half sovereign column*, will have only two. As to the words inserted, "with a decimal coinage," see the answer to question 57.

QUESTION.

52. Is it not important, with a view to the simplicity and facility in calculation which are supposed to constitute the great recommendation of a decimal system of coinage, that there be not more than one hundred steps between the highest and lowest monies of account?

* Everybody who observes must note the great difference between the way in which one and the same thing is spoken of when it is an argument against change, and after the change is accomplished. Accordingly, all persons who wish to be true prophets treat the terrors of an innovation by a process inverse to discount. Their present value is about five times their value when due.

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ANSWER.

At present there are 960 steps, to the banker 240; but, practically, the steps of the common people are only the steps up to two or three shillings, in farthings. In the new system, the banker will make his pound 100 cents, with, at furthest, an additional column of half-cents, and the people, who will reckon in florins, will have the 100 mils. So that each class will have 100 steps from its lowest coin to its highest. I state this merely as a fact, not admitting the validity of the argument implied in the question.

QUESTION.

53. Is not this the case in all the principal decimal coinages now in use, *ex. gr.*, franc and centime in France, dollar and cent in the United States, &c.?

By an Act of Congress passed in the year 1792, it was ordained that "the money of "account of the United States shall be expressed in dollars or units, dimes, or "tenths, cents or hundredths, and mils or thousandths."

Notwithstanding this long-existing state of the law, we are now told, upon the authority of the Director of the Mint, that in that country they "have but two denominations "of money of account,—the dollar and cent." And further, we are told "that "below the cent they do not usually reckon in mils or decimals, but in binary "fractions of a cent," that is, in vulgar fractions.

What inferences are to be drawn from these facts?

Do they indicate that, be the law what it may, in decimal coinage more than two monies of account, and more than one hundred steps between the highest and the lowest unit, are found to be practically inconvenient, and, in truth, unworkable.

And further, that the broken parts of a low unit, such as the cent in the United States and the penny in this country, are more conveniently represented by vulgar fractions than by decimal notation.

Upon what other supposition can this established departure in practice from the millesimal division of the dollar distinctly laid down by the law be accounted for?

The annexed statement deserves attention; it appeared in "The Times," April 4:—

"New Orleans, March 19.

"Cotton.—Sales to day, 3,500 bales, at an advance of $\frac{1}{8}$c., the market closing "firm. New Orleans, middling, $13\frac{1}{8}$c. to $13\frac{1}{4}$c.

"Sugar has advanced $\frac{1}{8}$c., and sells for $10\frac{1}{8}$c., to $10\frac{1}{4}$c.

"Breadstuffs quiet. Pork firm. Lard advanced $\frac{1}{4}$c.; kegs, $14\frac{3}{4}$c.

"Freights.—Cotton to Liverpool, $0\frac{3}{3}$d., and to Havre, $\frac{7}{8}$c."

The broken parts of the cent are all stated in vulgar fractions, in opposition to the law already quoted.

These fractions, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{2}{3}$, $\frac{7}{8}$, can none of them be stated accurately in tenths of a cent.

In the case of a rise of $\frac{1}{8}$ cent in cotton, this, stated decimally, must be given as a rise of 1 mill or 2 mills. There is, however, a small difference; the first is too little, the second is too much. What must be the effect of this unavoidable difference, small per lb., when multiplied into the number of lbs. contained in 3,500 bales of cotton? What is the lesson to be derived from these considerations?

ANSWER.

The French and Americans cannot have more than 100 steps: their highest coins are too small. They both feel the want of larger coins. The extremes of wealth and poverty are well contained in the breadth of our coinage. Pounds, florins, cents, for the bankers; florins, cents, mils for the poor. It would be well if revenue were reckoned in some higher denomination.

Decimal nations use binary fractions of their lowest coins. Be it so; we can do the same if we find it most convenient. A man who has worked his way above bread and cheese diet is not forbidden to take cheese after his meat if he please. By adopting decimal reckoning we lose no power of ordinary fractions; but we gain the power of decimal fractions. Ask the French or Americans to give up decimal coinage; tell them they show they ought to do it, because they halve and quarter their lowest coins; and see what they will answer.

We see that no *abstract arithmetic* prescribed by laws will be introduced unless it be supported by coins of legal tender. This is a lesson for the penny scheme.

The binary fractions occur, not in accounts, but in statements of price, &c., from which items of account are made up. It is natural that modes of stating prices should long remain unaltered. They are matters of conception, and of connexion between the past and present. It may be that cotton would long rise and fall by eighths of the penny of four mils. And if so, for this reason: Because the cotton speculator has a mine of associations connected with the effect of an alteration of $\frac{1}{8}$d. All his inferences upon the difference between probable and improbable, rashness and prudence, ruin and prosperity, depend upon experience of what has happened in a market fluctuating by eighths. And pure decimal reckoning consorts admirably with binary-fraction prices taken from the lower coins. These prices are never added up; totals calculated from them are added. I am told that the two largest cotton brokers in the world, Mr. Holt and Mr. Wrigley, are for a decimal coinage.

The question seems to me to propose the following argument. The French and Americans have decimal coinage and accounts, in which they find, so they say, a great advantage. But they use binary division when they go below account. Therefore let us continue binary *and ternary* division *in* our accounts. The argument is more logical when turned the other way; let us decimalise our accounts that we may obtain the advantage, and imitate their example as to the lowest coin, if we find it convenient. It seems to me that the argument, as stated, is just as good as the following would have been in the mouth of an Irish cotter of a century ago. The nations which do not allow the pigs to run about their cottages all declare that their dwellings are more comfortable than ours. But they all build out-houses for their pigs. Therefore let our pigs still run about our cabins.

QUESTION.

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54. If with us the £ sterling be retained as the principal money of account, does not a subdivision into one thousand parts become unavoidable, with the addition of intermediate monies of account between the £ and the mil ?

55. Will not this constitute an important difference between the decimal coinage of this country and the decimal coinages now in use in other countries, much to the disadvantage of our decimal system as regards simplicity and convenience of calculation, and especially of mental as distinguished from written calculation, which the middle and lower orders are constantly called upon to perform in their daily transactions ?

ANSWER.

Of course our pound will be divided into 1000 parts, as now into 960. But, as before explained, this is an advantage. We have pound, florin, and cent for the banker's book, and florin, cent, and mil for the poor man's score. And even if the bankers choose to retain a five-mil column, there is much gain for them still, and infinitely more for the community at large. But the banker will not go below cents, and will bid adieu to copper account.

QUESTION.

56. Under our present system is not the high value of our integer, the £ sterling, a source of great convenience and advantage, especially as compared with the lower value of the franc in France and the dollar in America,—

First, as facilitating the conception in the mind of large values, and expression of them in fewer figures and with fewer words :

Second, as admitting of a greater multiplicity of clean fractional divisions ?

ANSWER.

Yes, and for the first reason. There is no use in inventing high units merely to fractionise them ; multiples of lower units are better.

QUESTION.

57. By the adoption of the decimal system will not this advantage be converted into a great inconvenience ?

Will not our high integer, by necessitating the intervention of one thousand steps between the top and the bottom of the scale, instead of one hundred steps, as in other countries, become the source of confusion and inconvenience, and render the adoption of the decimal scale in its most advantageous form impossible with us ?

ANSWER.

No. Decimal reckoning enables every one to put his unit in the convenient place. This difficulty about units is an importation from the old system, in which the separate units are under the lock and key of 12 and 20. It is then made difficult to pass from one unit to another; but in decimals this is done by inspection. The common system among us has *four* units subordinate to the pound; for the shillings column is of *two* units. Even the banker has three subordinate units. Every column which has its separate addition is a unit column. What confusion or inconvenience could possibly arise in the first of the following additions, more than in the second ?

£	*fl.*	*ct.*	*m.*
2	7	3	4
1	9	2	8
15	1	2	5
19	7	8	7

£	*s.*	*d.*	*q.*
2	14	8	$\frac{1}{4}$
1	18	6	$\frac{3}{4}$
15	2	6	
19	15	9	

I confess myself quite unable to understand a great part of what has been written about the *unit*. There seems to be a notion that some mysterious thing called *the* unit exists in all calculation. This is true when we reduce calculation to pure counting, and use pebbles. But the great principle of abbreviation in arithmetic is the introduction of *successive units*, each consisting of a specified number of the preceding unit. We laugh at the school-men, as we call them, in our day; but we fail of none of their confusions, though we do not always attain their excellencies. I have a strong suspicion that if some writer on *the* unit would clearly explain himself, an old dispute about the true correlative meaning of *genus* and *species* would raise its head again.

QUESTION.

58. And further, will there not necessarily be a less number of clean fractional parts under a system which resolves the £ sterling into one thousand mils, than under the present system, by which it is resolved into 960 farthings, inasmuch as 1000 admits only of fifteen divisions without a remainder, whilst 960 admits of twenty-seven divisions without a remainder; and the results thus produced are again susceptible of division under the present system, but will not be so under the decimal system ; *ex. gr.*, the eighth part of 960 is 120, which is again divisible by 2, 4, &c. without remainder; but the eighth part of 1000 is 125, which is not susceptible of further division by 2, 4, &c. without remainder ?

ANSWER.

What! more clean fractional parts ? See the bulk of the first half of the answers.

QUESTION.

59. In commercial, trading, and banking accounts all sums less than a penny are now omitted from considerations of convenience and saving of time in account-keeping. But under a decimal system, which divides the £ integer into mils, the fourth or mil column must in all cases be retained, as the omission of it would involve the omission of all sums up to $2\frac{2}{5}d.$ The effect of this will be an increase of 10 per cent. in the number of figures used in all such accounts. Will not this increase in the number of figures used in such accounts interfere with the brevity and simplicity of expression, and the saving of time in account-keeping, which are anticipated from the decimal system ?

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ANSWER.

Leaving out all I have said about the banker rejecting mils, let us suppose that he retains the five mils when it occurs. Accordingly he will have an additional column, blank as often as not, filled with 5 as often as not. Hence, for sums under £100, while the existing system costs 457 figures for 100 items, the pound and mil system will require only 439 figures. Let him fill up with 0 when the 5 is wanting, and he has 489 figures. Both the saving and the expenditure are equally beneath notice when the importance of other considerations is duly estimated.

QUESTION.

60. The decimal scheme now under our consideration will retain the shilling and sixpence as fractional coins, but will it not destroy the peculiar advantage which now attends them, namely, their convenient divisibility? A shilling resolved into 50 mils is divisible only by 2, 5, 10, and 25; but the same shilling, resolved by our present system into 48 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, and 24.

61. Is it not a serious objection to the proposed scheme, that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of every thing which they require, and to the use of which they are well accustomed; whilst, on the other hand, it will give them the divisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use?

"A glance of the eye is sufficient to divide material substances into successive halves, "fourths, eighths, and sixteenths. A slight attention will give thirds, sixths, and "twelfths. But divisions of fifth and tenth parts are among the most difficult that "can be performed without the aid of calculation. Among all its conveniences the "decimal division has the great disadvantage of being itself divisible only by the "numbers two and five. The duodecimal division, divisible by two, three, four, and "six, would offer so many advantages over it, that while the French theory was in "contemplation, the question was discussed, whether the reformation of weights and "measures should not be extended to the system of arithmetic itself, and whether "the number twelve should not be substituted for ten as the term of the periodical "return to the unit."—QUINCY ADAMS's *Report*, p. 71.

ANSWER.

All this has been fully discussed in answer to the same objections stated in other words.

QUESTION.

62. The proposed scheme involves an absolute change in the value of all the lower coins. The penny and all multiples of the penny other than six and twelve will not be interchangeable at equivalent values with the new decimal coins; and again, the two lowest monies of account in the decimal system, cents and mils, will be uninterchangeable at equivalent value with any of the present copper coins, although these latter form parts in odd pence of a large proportion of existing contracts, especially amongst the lower classes, and constitute an immense proportion of the existing coinage.

From this cause it is anticipated by some persons that confusion and difficulty in their accounts, some unavoidable loss and injustice, and a vague but dangerous impression of more extensive injustice will arise amongst the mass of the people.

Whereas a decimal scheme founded upon the penny or the halfpenny would involve no real change in the value of any of our coins, but would only involve some additional trouble to the richer classes by giving a new numerical form to their high integer, the £ sterling, but not involving any absolute change in its value.

Do you think these apprehensions well founded, and what is your opinion of the extent and importance of this difficulty?

ANSWER.

We now come to a new sort of difficulty. I suppose* the question admits that the new farthings, namely, the old farthings altered in value, will interchange well enough with the new pence, that is, with the old pence ratably altered in value. It is necessary to have a clear understanding upon this point, because in quarters where no such confusion would be looked for, arguments have been held which rest upon the difficulty of expressing an old penny in new mils, and upon the assumption that reckoning in old pence will continue after the copper piece called the penny has changed its value. In fact, we have had seriously propounded the harbour-master's difficulty, who, when the pier was to be raised three feet because the decks of the packets were to be raised three feet, was in great distress of mind to know how people were to mount from the *old* pier to the *new* packets. The question reminds us, without falling into any mistake about it, that we shall, *for one day*, encounter the harbour-master's difficulty. The new packet must, *for once*, lie to at the old pier.

A.B. goes to bed on the last night of farthings, with six copper pence in his pocket, the equivalent of a half-shilling bit, which he has exchanged for them during the day. He rises on the first morning of mils an impoverished man. A Government flea has bit his pocket in the night, and has eaten four parts in the hundred of the value of his copper. His six copper bits will no longer change for the half-shilling bit: they want a new farthing, $\frac{24}{25}$ of the old farthing, to be what they were before. This never happens again: in all time to come, warned by bitter experience, he will not let his half shilling go until he sees the odd farthing which is to come in. This tone is no exaggeration. This spoliation, this robbery of four per cent. of a man's odd copper, done once in his life, that he and his children may be benefited for ever, has been spoken

* The wording may seem to refer to *old pence* which are to keep their old value, while *new decimal coins* come in against which they cannot be exchanged. But I suppose this is not meant. The *old penny* becomes one of the *new decimal coins*, as four mils.

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of as if it were a thing to rouse a patriot and kill a philanthropist. The prime minister addressing a deputation on the very point, represented the poor man as saying to himself with the six coppers in his open hand, and a gloom on his countenance, "now I shall have to go and work before I can make this into a silver sixpence." It would be hard to prove, and it certainly would want proof, that any labouring man ever calculated the time of a farthing's worth of work. At ten shillings a week, and over ten working hours a day—the decimal system which is the real horror of a poor man—a farthing's worth of work is half a quarter of an hour. One manual labourer with another, it is about half this time, that is, *three minutes and three-quarters*. Now, if the Balaclava mess cost only one extra million, which is saying very little indeed, and if five million of adults have to work out that million at 40 shillings a week, which is saying too much, each individual must work six hours; that is, supposing such a wretched piece of work as that at Balaclava to occur only once—which requires a large dose of the charity that hopeth all things—the mess cost 48 times as much work as the establishment of the decimal system will cost, and with no set-off to count.

The set-off is as follows. In by far the greater number of instances the poor man will get as much for his mil as he did before for his farthing; that is, for a loss upon one sixpence, if he should happen to have coppers to that amount, he gains nearly as much on every silver sixpence which he gets for weeks and months after.

Now to the question, will this abolition excite a feeling of dissatisfaction, and a dangerous impression of extensive injustice among the mass of the people?—No; and for these reasons. First, the mere appearance of 25 farthings instead of 24 in change for a half-shilling will look like an augmentation; secondly, the cheapening of goods which competition will immediately cause, will make the new mil nearly as good as the old farthing, and will justify the appearance; thirdly, the question about the price of goods, and about which will be lowered and which will not, will have an interest which will utterly swallow up all power of considering the fate of the coppers which happen to be in the pocket at the moment of the change, or the fraction of a mil lost or gained in an outstanding debt.

Wages are received in silver, and the silver has more copper in it. This is the fact which will be most easily apprehended.

The question tells us that the penny system will leave the poor as they are, and give some additional trouble to the rich. This is a true description. Why then take the penny system into consideration? The existing system is clearly better, for it will leave both poor and rich as they are. We do not want decimals, except for convenience. The pound and mil system will save trouble both to rich and poor.

Of course any change whatever must be widely made known and clearly explained. I have no doubt that the clergy of all denominations, the postmasters, the excise officers, and the turnpike keepers, will very willingly aid the comprehension of their neighbours; and all these classes should be furnished with official explanations. The numerous railroad stations, with their intelligent officials, put the country in a very different position from that which it had in 1816, as to the promulgation and explanation of any new matter. When I was a boy, the people used to get round the guard of the mail coach on its stopping, to set their watches by his time. Now, every place where the coach stops has a good clock of its own, visible all day. As the power of asking the guard a question once a day is to the power of looking at the station clock at any hour of day or night, so is the old means of disseminating information to that which now exists. On reading this answer again, I see that one of the points of question is, whether a *dangerous* impression of injustice would arise. In plain words, would people so much dislike the loss of a farthing or its fraction, once for all, that they would be likely to resist it by force? Believing that no impression of injustice would result, I believe of course that no dangerous impression would result. But to the question, supposing such an impression *were to arise*, would it be a *dangerous* one? So striking an Act of Parliament could not pass the Houses without attracting universal attention. Supposing the Act to pass, it would be clear that the general feeling of the members of the House of Commons would be that no danger need be apprehended from ignorant alarm as to the meaning of the change. If a respectable minority of the House were to apprehend danger, and show their grounds of apprehension, such a measure would not pass. Consequently, there is little need to mix up this question with the question of the relative advantages of the two coinages. The matter must come before parties who are much better judges of the state of popular feeling than the arithmeticians who answer these questions. I may even be permitted to submit to the Commissioners whether their function extends to offering an opinion upon the point.

Next, it may fairly be questioned whether the people at large have earned the continual reference which is made to the possibility of their resisting unpopular measures by force. There is but one contingency which really deserves attention. Supposing the act passed, and a day named, which could not be a very close one, for its taking effect, circumstances might occur which would render the Government unpopular at the time when the day was approaching, on grounds wholly unconnected with the coinage. In such a case it is very possible that the coinage might be misrepresented in such a manner as to cover it with the current unpopularity of the ministry. Suppose the act to take effect, not on a given day, but on a day to be named by the Queen in council, and this contingency is sufficiently guarded against.

QUESTION.

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher classes,—those who keep extensive accounts, and enter into large calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multiples and subdivisions?

ANSWER.

The advantage of decimal coinage will be more felt by the poor than by the rich. The effec. upon education will be very decided. No one has denied my assertion that 95 hours will be as good as 100 hours now are. Many *think* I have underrated the benefit; I *know* I have done so, and I did it on purpose. And many of the 95 hours will be turned into easy hours instead of difficult ones, or better still, into hours of healthy difficulty followed by feeling of success, instead of hours of mere drag followed by discouragement. By the time the pound and mil system is fairly established, the son of a day labourer will have a much better chance of rising to a clerk's or

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accountant's place than he now has. By a rough calculation, I am fully satisfied that the pound and mil system will be a much greater boon to the labouring classes than the opening of the public services (India included) is to the middle classes. I mean in the way of putting a rise in life within the reach of the more intelligent of their sons.

QUESTION.

64. In connexion with the foregoing considerations, it has been suggested that a vast majority of the smaller money transactions in a community are not transactions of written account at all; that they arise out of retail purchases made in the market or the shop, the calculations connected with which are necessarily performed in the head, and are not reduced to writing. That for these purposes, namely, adaptation to the existing division of our weights and measures, for distinctness of mental conception and facility of calculation in the head, our existing coinage is better adapted than a decimal coinage; whilst the supposed superiority of a decimal coinage for purposes of written accounts and calculations is not applicable to such transactions, and would not prove beneficial to the great mass of the people with whom such transactions are of constant daily occurrence.

How far do these considerations constitute a just ground of objection to the introduction of a decimal coinage? or what reply can be made to them?

ANSWER.

All the transactions of the poor will be facilitated by decimal coinage. But the questions do not come to close-quarters on headwork at the broken prices which actually occur. Let any number of questions, such as concern the poor, be collected by the Commission, and solved by those who would retain the existing system, in their own way. Let them concern the great articles of daily consumption, bread, cheese, meat, vegetables, beer, tea, sugar, coffee, pepper, tobacco, &c., &c. Let them be taken from actual prices; let it be stated for each whether it is to be done by pen work or by head work, and let the work of the common system be handed to me. I will undertake to add the way of working in the decimal system, and I will make it apparent that the medley of our weights and measures adapts itself to a decimal coinage better than to the existing coinage. A hundred or two of questions, in answer to my challenge, will be much more to the purpose than general arguments about *clean* fractions, which can only be supported upon *even* prices. The questions proposed are worthless as a trial of the actual wants of calculation of the poorer classes.

QUESTION.

65. Looking to the considerations alluded to in the preceding questions, the superior facility of division possessed by 12, the further very convenient and almost unlimited facility of division arising from our peculiar mode of reckoning the £ integer into shillings, pence, and farthings; the harmony which exists between our fractional coins and our weights and measures, the double advantages in facility of calculation to be obtained from decimal coins unaccompanied by decimal weights and measures, and the brevity and convenience of expression, oral and written, which attaches to our present coins;—duly weighing, on the other hand, the advantage of assimilating the progression of coins to that of figures, the simplicity and facility in keeping accounts and making calculations, the saving of time in education and of labour by the substitution of simple for the proverbial inconvenience of compound arithmetic, which it is expected will arise from the introduction of decimal coinage;—

Is it on the whole prudent to make the experiment? Is the result sufficiently certain? Will the increase of convenience be sufficiently great and fairly diffused over all the classes upon which the inconvenience of the change must fall? Or must we come to the conclusion that the advantage of the change is neither so important nor so well ascertained as to justify the disturbance of our existing system, and of the habits and computations founded upon it?

ANSWER.

Looking at both sides of the question; allowing to the existing system its sole superiority, that it *is* the existing system; looking at the full and long discussion which the question has received; at the foreign countries which have adopted decimals and found them all they were said to be; at the reports of the scientific Commissions, which have shown themselves truly English in their cautious mode of treating existing things; at the evidence taken before the Committee of the House of Commons; at the arguments held in the House itself, and at their result; at the feeling of society in general, and of the mercantile world in particular, which is favourable where the question has been examined, and quiescent where it has not; and at the actual facilities produced and demonstrated:—

It may be confidently affirmed that this is no experiment, but a well-considered and well-tested improvement, which it would be foolish in the highest degree to reject; that its temporary inconveniences are far less than the usual inconveniences of great changes; and that the inconveniences bear so slightly on every class, that it is difficult to say which class has least; that the disturbance of our existing system is wonderfully slight, so that instead of saying new habits are to be formed, it would be more correct to say that old habits are to be kneaded into better ones. In a change which leaves the sovereign, the florin, the shilling, the half-shilling as they are, and only calls the half-shilling sixpence-farthing, the old system will be a crutch to the new system for the few weeks or days during which a crutch is wanted.

University College, London,
April 25, 1857.

A. DE MORGAN.

J. A. Franklin, Esq.

(*Communicated by Lord Monteagle.*)

J. A. FRANKLIN, Esq.

Answer to Question 1. I think a change desirable in the lower gradations of our token coinage, below the half-shilling piece.

2. Because of the want of coins at that stage which might be optionally treated, either as units, or as parts of higher values, without more complex modes of reckoning, computing, and accounting, than by the natural notation of the ten fingers, the universal language of the Arabic numerals.

3. In so far as the farthing is $\frac{1}{960}$ instead of $\frac{1}{1000}$ of our legal standard of value (the £ sterling), not only that coin (the farthing) but all its multiples below $\frac{1}{40}$ of the unit standard of value are necessarily complicated fractions of it, and therefore less convenient for all purposes than would be coins which, being continuously decimal, or binary and decimal, might be dealt with at pleasure either as fractions of the £1 integer, or as integers themselves, self-expressed in any denomination of value by the same digits, without needing to be reduced or converted.

4. The primary conception of coin is a value-metre; it is secondarily employed, in its capacity of a value-token, as an instrument whereby to effect an interchange of equivalents of various kinds. Value or price is primarily computed by so many unit coins, and not by so much of a large value. We more frequently count coins than take "change" for them. The notion that the "primary purpose of coins" is to serve "as fractional subdivisions of the integer," seems disproved by the disappearance of a great variety of coins minted from time to time as fractions of the gold integer, *i. e.*, the "double royal or sovereign," of Henry 7th, the "pound sovereign" of Henry 8th, the "unit" or "xx" shilling piece of James 1st.

These fractions could scarcely have dropped out of the currency if a multiplicity of such divisors had been found either necessary or convenient. One of my earlier papers "On the Expediency of at once Decimalizing English Monies and Weights," read before the Society of Arts, was illustrated by an historical diagram of these "fractional subdivisions." The lowest of them was $\frac{1}{24}$ of a penny, and its relations to the penny piece and to the £ sterling were precisely those of the grain to the pennyweight and to the lb. troy. All practical men know that this "correspondence" or "harmony" became eventually of no use so ever. As to the weight, we now employ the ounce alone, decimalizing both its parts and its multiples. Whenever we are at liberty to do the like with our monetary system then and then only will there be harmony between weights and prices, because gradations will not be simply analogous, but identical and uniform.

5. To carry out the decimalization of our coinage through the stage which remains to be decimalized would not involve any "sacrifice," inasmuch as petty traffic would thereby be facilitated as well as commerce on the large scale.

6. "Small payments" are only the final processes in small traffic. In such markets the buyer is not altogether unconscious of loss when commodities are parcelled out into quantities not uniformly commensurable by the instruments wherewith he buys; but it is notorious that he is no match for the more practised computer, who fixes prices so as to mulct him beyond what he is aware of for the extra trouble of subdivision, for additional drafts of scale, and the like.

The less "affluent and educated" is the buyer, the more useful to him are instruments of reckoning analogous to his ten fingers.

7. The Decimal principle already exists in our coinage. I recommend that it be carried out.

8. *Vide* Answer, No. 15.

9. Duodecimal coinage might be desirable if the arithmetical notation of the world were duodecimal—not otherwise.

10. The number 24 is not necessarily the best for coinage, because it happens to have more divisors than any other number of approximate magnitude. The Prussian thaler is now divided into 30 groschen instead of 24, as it used to be. Vide also answer to No. 30.

11. The quotation from Napoleon begs the question at issue. Moreover, the question is not merely of "dividing the integer," nor does decimalization prevent binary subdivision to a convenient extent.

12. A binary system of subdivision would have certain advantages, yet nobody proposes a pure binary system of money or account.

With reference to the arithmetical examples given in this and following questions I crave permission to observe, that inasmuch as every monetary system has its peculiarities which, being peculiarities, cannot be superadded to those of an altered system, so problems framed in the special interest of the system of £ *s. d.* and *qr.* cannot be so simply solved by decimal, *i. e.*, common arithmetic. It were easy, were it warrantable, to turn the tables in cases like that stated in these questions, and show, for instance, that boxes of commodities containing 10lbs., 100lbs., and so on, costing 4 cents. per lb., 4 florins per 10 lbs. and £4 per 100 lbs. would be less conveniently computed at 9·6 pence per lb., 8 shillings per 10 lbs. and £4 per 100 lbs.

Hence (in reply to the concluding query) it is not "by cases of this kind (those selected) that the relative convenience of different systems of coinage must be tested."

13. The construction of coinage is not "necessarily a divisional process," nor is it "the metrical subdivision of the integer for fractional payments in connexion with retail transactions." If in the system of £ *s. d.* the £ is spoken of as "the integer," then to decimalize the £ downwards is to afford a choice of no less than four integers, any one of which may be employed as the unit, according to the magnitude of the idea of initial value which the object valued suggests to the mind

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It is an inconsiderable minority of the public, such as bankers, capitalists, and the like, who regard tangible monetary tokens as mere change for, or fractions of, higher values, employed, not in realizing their income, but in paying small broken parts of a large expenditure. On the other hand, to the many, coin is the symbol of their earnings, increments to be conceived additively. An illustration of this, is the desire of workpeople to receive their wages in the shape, *i. e.*, the denomination of coin, in which they are to be spent or distributed.

I concur with the authority quoted, that "decimal arithmetic for the purposes of computation shoots spontaneously from the nature of man and things." That it is "equally adapted to the numeration and multiplication of material substances," seems proved by a current estimation of some commodities by scores, by tallies, by hundreds, by thousands, &c. Prices are even now quoted decimally, instead of in the equivalent money of account or payment, because a much clearer conception of proportionate difference in price is afforded thereby. "95*s.* to 96*s.*" is a quotation significant of a relative increase of 1 in 96, whereas, "£4 15*s.* to £4 16*s.*," besides being less concise for utterance and record, is significant of an increase of $\frac{1}{20}$ in $4\frac{3}{20}$—a rather complex idea. In like manner commodities are quoted at "37 to 38 pence," instead of "3*s.* 1*d.* to 3*s.* 2*d.*" In the metal market such quotations as "zinc at 147*s.*" are common, and in the congeries of markets, known as "Mincing Lane" it is an ordinary practice to quote prices and even make out invoices by the use of decimal expressions, notwithstanding that they must be reduced to £ *s. d.* in order to be carried out and posted.

As to division, there is a natural disposition to divide binarily; but it is controlled without our being conscious of it, by the converse habit of aggregation which is, quite as naturally, decimal. The factor 3 which is in the duodecimal system, being eliminated, both decimal and binary division are practicable alternatively or even concurrently. In decimal computation, the figure 5 is no less familiar as $\frac{1}{2}$ of a higher integer than as five times a lower one.

The form in which a Frenchman represents 5 at the end of a sum is as significant to him as $\frac{1}{2}$, and he makes it without lifting his pen, which must be done twice in writing $\frac{1}{2}$. The practised arithmetician instead of multiplying by 5 divides by 2, instead of multiplying by 25 divides by 4, instead of multiplying by 125 divides by 8.

14. Compare the same three systems in the following table, framed, this time, in the interest of the decimalized pound, merely substituting for $\frac{1}{12}$ of a shilling, the $\frac{1}{10}$ of a shilling—the smallest increment likely to be represented in formal accounts under the proposed system :—

£ and mil.	£ *s. d.*	Tenpences.
1	1	24
99 5	19 $10\frac{4}{5}$	23 8·8
99	19 $9\frac{3}{5}$	23 7·6
98 5	19 $8\frac{2}{5}$	23 6·4
98	19 $7\frac{1}{5}$	23 5·2
97 5	19 6	23 4
97	19 $4\frac{4}{5}$	23 2·8
9 5	1 $10\frac{4}{5}$	2 2·8
9	1 $9\frac{3}{5}$	2 1·6
8 5	1 $8\frac{2}{5}$	2 4
8	1 $7\frac{1}{5}$	1 9·2
£7 24 5	7 4 $10\frac{4}{5}$	173 8·8
26 figures.	33 for whole numbers, 20 for fractions. — 53 figures.	31 for pence, 10 for tenths. — 41 figures.

15. It is obviously possible to break the integer £1, by means of its constituents 960 farthings, into no less than 27 aliquot parts; whereas the £1 of 1,000 mils is divisible only into 15 parts.

960 Farthings.

	s.	*d.*		*d.*
$\frac{1}{2}$	10		$\frac{1}{10}$	6
$\frac{1}{3}$	6	8	$\frac{1}{48}$	5
$\frac{1}{4}$	5		$\frac{1}{60}$	4
$\frac{1}{5}$	4		$\frac{1}{64}$	$3\frac{3}{4}$
$\frac{1}{6}$	3	4	$\frac{1}{80}$	3
$\frac{1}{8}$	2	6	$\frac{1}{96}$	$2\frac{1}{2}$
$\frac{1}{10}$	2		$\frac{1}{120}$	2
$\frac{1}{12}$	1	8	$\frac{1}{160}$	$1\frac{1}{2}$
$\frac{1}{15}$	1	4	$\frac{1}{192}$	$1\frac{1}{4}$
$\frac{1}{16}$	1	3	$\frac{1}{240}$	1
$\frac{1}{20}$	1		$\frac{1}{320}$	$\frac{3}{4}$
$\frac{1}{24}$		10	$\frac{1}{480}$	$\frac{1}{2}$
$\frac{1}{30}$		8	$\frac{1}{960}$	$\frac{1}{4}$
$\frac{1}{32}$		$7\frac{1}{2}$		

48 figures.

1,000 Mils.

$\frac{1}{2}$	5		
$\frac{1}{4}$	2	5	
$\frac{1}{5}$	2		
$\frac{1}{8}$	1	2	5
$\frac{1}{10}$	1		
$\frac{1}{20}$		5	
$\frac{1}{25}$		4	
$\frac{1}{40}$		2	5
$\frac{1}{50}$		2	
$\frac{1}{100}$		1	
$\frac{1}{125}$			8
$\frac{1}{200}$			5
$\frac{1}{250}$			4
$\frac{1}{500}$			2
$\frac{1}{1000}$			1

19 figures.

The question at issue is, whether the sacrifice of such divisions as are not common to both systems is worth making, in order to reconcile our monetary system with common arithmetic, to acquire, in placee of one integer, no less than four significant of each other at a glance, and to secure other advantages elsewhere recited.

If it would be worth while to notice further the economy of mere cyphering, then we find the advantage obviously in favour of the Decimal System, *e. g.* :—

$\frac{48}{27} : \frac{19}{15} :: 80 : 57 :: 100 : 71\frac{1}{4}$ per cent.

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Figures are of course economized in proportion as amounts can be represented by single numerals instead of two or more. Now under the £ and mil system there are no less than seven values which may be expressed, represented, and recorded by single numbers, five of them being coins already current and familiar. Vide the following group. Those marked with an asterisk do not yet exist; but there needs be no delay of the desired change for the want of those two coins so long as we have the ½ shilling of 25 mils, and the old copper representing 1, 2, and 4 mils respectively.

£	f.	c.	m.
1			
	5		
	1		
		5	
		1*	
			5*
			1

On the other hand there exist only three single numeral coins—1, 2, and 4 farthings, towards a Decimal System founded upon the unreduced farthing; and but a solitary one, the penny token itself, towards the proposed tenpenny system.

I venture to express a belief that the seven coins above enumerated might eventually suffice for all purposes, and correspond with the extension of the system in our bank note currency of £5, £10, £50, £100, £500, and £1,000.

When coins are not readily distinguishable in respect of dimension, colour, weight, &c., mistakes are unavoidable. If in payments there needed be no more than four like pieces, then both oral and mental counting, usual sources of error, might either be dispensed with or any how checked by a glance. The larger the variety of coins the greater the risk of mistakes in sorting, selecting, and computing them.

The token of £$\frac{1}{10}$ is rapidly superseding that of £$\frac{1}{8}$, and their concurrent circulation, because of their resemblance, is generally complained of. The quarter-franc has been withdrawn in favour of the 20-centime piece, and so with the coins in other countries.

16. Decimal Coinage is desirable whether weights and measures be decimalized or not. Witness the experience of the United States and other nations.

17. Commodities are not necessarily divided for retail purposes, they are also collected or selected. In such cases the charge is made for the aggregate value, at per given quantity or number multiplied, and not for a fractional part of some larger quantity or number.

The practicability and convenience of adjusting a coinage apart from weights and measures, are exemplified by countries which have decimalized their coinage in advance of weights and measures; and the practicability and convenience of the converse are even now exemplified in Germany, where weights are being decimalized in advance of the coinage.

18. Our weights are binary to a very small extent, and our measures scarcely so at all. *Vide* Answer to No. 13 (last paragraph).

19. Those who retail by the lb. do not buy by the quarter (of 28lbs.), but by the cwt. itself, sometimes regarded as 100lbs. plus 12 per cent. thrown in for drafts and contingencies. Those who retail by the yard (for which in like manner they get 37 inches) take no account of the foot at all, but subdivide into halves, quarters, and eighths, notwithstanding that the eighth of a yard is not expressible by a whole number of inches.

No reduction in wholesale prices, except it be so large as £3 14*s.* 8*d.* per ton, £1 17*s.* 8*d.* per cwt., or 4 pence per lb., affords any advantage to the small buyer at per ounce, so long as neither coins nor weights are graduated decimally.

20. An inch at 1*s.* per yard (one of the instances adduced in this question) cannot now be paid for in coin, except at a loss of 25 per cent. to the seller, or else of 50 per cent. to the buyer The value is one-third of a penny. A farthing, the nearest coin, is one-fourth less; and two farthings are half as much again. At a shilling per yard, the fractions usually dealt in are three, viz., $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$. At 50 mils 5 cents, or $\frac{1}{2}$ florin per yard, the fractions might conveniently be nine,—viz., 1, 2, 3, 4, 5, 6, 7, 8, and 9 tenths; of these, 2, 4, 6, and 8 tenths will be familiarly known as 1, 2, 3, and 4 fifths, just as "$\frac{1}{5}$" following the pence column is conceived and added as $\frac{2}{4}$; and $\frac{5}{10}$ will be equally significant of $\frac{1}{2}$ a yard. The prices of these nine fractions will be expressed in the same denomination of coin as the price per yard,—*e. g.*, 5, 10, 15, 20, 25, 30, 35, 40, and 45 mils respectively.

21. Decimal money while it suggests and facilitates the subdivisions just enumerated, needs by no means prevent binary subdivisions. The German journals are now publishing a recent convention for decimal weights, on the basis of 500 grammes or $\frac{1}{2}$ kilogram, French, accompanied by explanations, showing that halves, quarters, and eighths, may at any stage be represented decimally.

22. When money is decimalized in advance of weights, then retail prices, which are usually so stated as to ingratiate the buyer, will be quoted at per ounce: say 4 mils, with a bait of 4oz. for 1½ cent or 15 mils,—a well understood grace of 1 in 16: just as 13 are given to the baker's dozen, 25 publications for 24, and the like.

23. The ton of 2,240lbs., $(2^5 \times 7) \times 10$, has 28 divisors; the £ of 960 farthings $(2^5 \times 3) \times 10$ has 28 divisors; the £ of 240 pence $(2^3 \times 3) \times 10$ has 20 divisors. A unit constituted of 1,000 parts has 16 divisors.*

$\frac{1}{2}$	1,000	500	250	125
$\frac{1}{5}$	200	100	50	25
$(\frac{1}{5})^2$	40	20	10	5
$(\frac{1}{5})^3$	8	4	2	1

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In 2,240, the binary system of subdivision may be carried through six stages; in 112 through four stages; and in 1,000 through three stages only; yet, in the United States and in our colonies, a practice prevails of reckoning the ton as 2,000lbs., and the cwt., as its name implies, as 100lbs. The Spanish eighths and sixteenths of a dollar have been demonetized and withdrawn.

24. If even all these assumptions, dated 1821, were something more than speculative, there would remain the expressive fact in 1857, that the United States adhere to a Decimal Coinage.

25. A process become convenient from usage, may be surpassed in convenience by other facilities. A rate which it is convenient should be divided, is sure to be so fixed as to become divisible.

26. This opinion of Sir John Herschel, who is an eminent advocate of the Decimal System in coins, weights, and measures, seems tantamount to an expression of his regret that we are not likely all at once to secure all the advantages which are in prospect.

27. Acquaintance is generally made with coins before there is occasion to employ weights and measures; and common arithmetic is mastered long before the complexities of compound arithmetic. The reconciliation of our monetary system with natural arithmetic could, if it were necessary, be accomplished at one stroke, without issuing new coins, or demonetizing existing ones; whereas the decimalization of our weights and measures would require time and care. Although it is easy to foster prejudices against any change, simply because it is change, yet if our money were decimalized the lesson would reach all classes, and the desire for further progress would become general.

28. Decimalization affords an opportunity to treat as whole quantities what can otherwise be treated only as broken parts or sections; but the process by no means precludes the notion of sectional or aliquot parts, computable by the convenient rule called practice.

The expedient whereby in the question given (215 tons 17 cwt. 3 qrs. 9lbs. at 9*l.* 11*s.* 6¼*d.* per ton) the value at 1*l.* per ton is represented as 215*l.* 17*s.* 10*d.*-$\frac{1}{28}$ becomes a still more ready expedient when that sum is represented as £215·8916, its obvious equivalent—

£	£
1	215·8916 at £9 11*s.* 6¼*d.*
8	1727·1328
10*s.* = ½	107·9458
1*s.* = 1/10	10·7945
6*d.* = ½	5·3972
¼ = 1/24	2249
	£2067·3868 = £2067 7*s.* 8½*d.*

This process dispenses with much time, mental effort, and risk of error, incidental to compound arithmetic. By pure decimals a like question would be propounded in this form—483·597 lbs. at £4·275 per 1,000lbs., and thus simply worked:—

	lbs. 483·597 at £4·275
4	1934·388
·25 = ¼	120·899¼
·025 = 1/40	12·089 37/40
4·275	£2067·377 7/40

The fractions are too minute to be taken account of.

29. The quotation from the Director of the United States Mint shows how readily a theoretical difficulty is surmounted in practice. The opportunity of employing money decimally will recommend application of the same simple method to our weights and measures.

30. The authority here quoted admits the patent fact, that parcels and prices of commodities are always accommodated to each other reciprocally. And just as in France "parcels are made up" to suit decimal in preference to duodecimal computation, so in England as in other countries can 3 as a divisor be dispensed with. Even in Southern Germany, where the florin (24½ to the mark of pure silver) is divided into 60 kreutzers, the dominant coin of change is the 6 kreutzer piece, or tenth of a florin, and accounts are sometimes kept in florins decimalized. This tenth of a florin is the increment of cab fares, and of middle-class traffic generally. The owner of this coin is not so much a competitor for commodities, as the seller of commodities is for the coin; so that quantities and qualities are in the nature of prices which fluctuate, not the coin which they may be said to purchase: just as eggs are sold by the shilling, and in the north of England flour is retailed at so many lbs. per shilling.

The expression a "cheap penn'orth" embodies the same fact; and when change for a shilling becomes 12 pence halfpenny, the 4 per cent. difference will be considerably less in proportion than the usual halfpenny rise or fall on the 4lb. loaf.

31. The tendency to decimalize weights and measures will steadily increase, and it merits to be encouraged.

32. Correspondence cannot be said to exist between the relations of weights or measures and

* The Decimal System comprehends also the binary and the quinary systems:—

1	2	4	8	2^n
1	5	25	125	5^n
1	10	100	1000	10^n

those of a monetary system, unless upon some uniform system of multiples and submultiples; be it decimal, quinary, binary, or otherwise (the first comprehends the other two):—

Decimal	10^3	10^2	10	1	$\frac{1}{10}$ $(\frac{1}{10})^2$ $(\frac{1}{10})^3$, &c.
Quinary	5^3	5^2	5	1	$\frac{1}{5}$ $(\frac{1}{5})^2$ $(\frac{1}{5})^3$, &c.
Binary	2^3	2^2	2	1	$\frac{1}{2}$ $(\frac{1}{2})^2$ $(\frac{1}{2})^3$, &c.

Compare the heterogeneous gradations now existing, of

Weight	$(20 \times 28 \times 4)$,	(28×4),	28,	1, $\frac{1}{16}$, $(\frac{1}{16})^2$, $(\frac{1}{16})^2 \times \frac{1}{27\frac{11}{14}}$.
Measure		$(4 \times 5\frac{1}{2})$,	$5\frac{1}{2}$,	1, $\frac{1}{2}$, $(\frac{1}{2})^2$, $(\frac{1}{2})^2 \times \frac{1}{9}$
Value		10^3,	10^2,	10, 1, $\frac{1}{20}$, $\frac{1}{20} \times \frac{1}{12}$, $\frac{1}{20} \times \frac{1}{12} \times \frac{1}{4}$.

It is impossible with gradations such as these, so to arrange quantities and prices upon a sliding rule as to work out results simply expressed; that is to say, the figures on the scale representing length or quantity will not be opposite to the like figures expressing price. It used to be supposed that correspondence existed between Troy weights and the money coined by them; 240 pence to the £ sterling, 240 dwts. to the lb. Troy; but the ounce Troy is now decimalized to the great satisfaction of all occupied with bullion.

As anciently in bullion, so it is still in petty traffic, value is the primary idea, and the quantity, weight, or dimension of the commodity is a secondary one. Witness such received standards as the "shilling's-worth," "sixpenn'orth," "a penn'orth," "a ha'porth," &c.

33. *Vide* Answer 21.

34. Granting the instinctive tendency to pursue the Decimal System here described, and the coincidence of theory and historical fact in its favour here quoted, it has been shown that to decimalize is not to take away the option of binary subdivision. Even as $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{2}$ a yard, *i. e.* $\frac{1}{8}$ or "half-quarter," is a familiar measure, although not a whole number of inches, so may $\frac{1}{8}$ of 100, of 10, or of unity be employed, whether that quantity be or not representable as an integer in all its relations.

35. It would be still more natural and convenient that the £ sterling should not be, as it now is, the smallest price available as an integer in decimal relation with its multiples.

36. The citations prove that Canada did not overlook or under-estimate the peculiar facilities of binary and duodecimal subdivision, when it preferred and adopted the Decimal System.

The questions here repeated have been already answered elsewhere.

The relation of $£\frac{4}{10}$ per lb. to broken quantities of the lb. is treated elsewhere.

37. The quotation here given exemplifies how readily decimal money might be accommodated to non-decimal weights and measures. "Protracted and multiplied experience" in America has removed early theoretical misgivings.

38. The ripe experience of many nations which have abandoned duodecimal coins proves that all the peculiar facilities afforded by such coins are well sacrificed for the far superior facilities peculiar to decimal coins.

39. The special aptitude of the number 960 has been acknowledged. It is not the most desirable factors of 960 which have to be rendered up in exchange for still greater desiderata.

40. It is even more easy to conceive and recollect 2, 4, or 8 times a certain integer than $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{1}{8}$ of a larger integer, especially if the product needs not be converted, reduced, or changed for other numbers, except at the option of the computer.

A pure "binary coinage" would require in addition to pieces now current, coins of 5*s.* (almost eliminated from circulation), of 1*s.* 3*d.*, of $7\frac{1}{2}$*d.*, &c. A duodecimal coinage requires pieces of 1*s.* 8*d.*, $1\frac{2}{3}$*d.*, &c. Ireland has had coins based decimally on the penny, *e. g.*, 5*d.*, 10*d.*, 20*d.*, &c.; the 20*d.* was in duodecimal ratio to the £. Despite the correspondence of that coin with the assumed duodecimal necessities of retail commerce, it has been dispensed with.

41. Discussed in preceding replies.

42. What is found satisfactory in our present coinage is the compromise to which long routine reconciles us. If the copper coinage were lowered 4 per cent., transactions would be recorded with still less occasion for compromise, and routine would in due course establish more correspondence and harmony between prices, accounts, and payments.

43. As I have endeavoured to show elsewhere, we are taught by the experience of all times and all markets, that whatever the monetary system, prices, lots, and parcels become adjusted thereto. Results diametrically opposite to the illustration here given would be exhibited by citing the actual transactions of a French market, and exposing in similar tables the sacrifices of economy and simplicity which would inevitably be consequent upon a return to the old French monetary system of £ *s. d.* (livres, sols, and deniers), the precise counterpart of our £ *s. d.*, which has there been happily superseded. France is not the only nation which has abandoned a monetary system strikingly analogous to our £ *s. d.* and *qr.*

It is a great mistake to suppose that where coinage is decimal buyers and sellers can only conceive quantities and values duodecimally.

With all due deference to the Director of the United States Mint, his natural predilection for the dollar unit has led him to suggest a material alteration of the monetary standard of value. By the legal prescriptions of the British and the United States Mints respectively,

$$\$1 : £\frac{5}{24} :: 2{,}169{,}909 : 2{,}200{,}000;$$

so that to substitute 24 dollars for £5 would be to mulct the creditor to the extent of nearly $1\frac{1}{2}$ per cent.

We have yet to learn from experience whether gold coins so small as the dollar and the 5-franc piece will maintain their standard weight in circulation better than the old quarter guinea which proved unsuitable.

The notion of revolutionizing a coinage in order to render it international is attractive but delusive. The Australian sovereign of one province, although of full weight and quality, does not circulate in the other provinces, much less here in England, and notwithstanding the connexion which exists between the imperial and the colonial mints. What chance, then, of foreign coins, if even mathematically equivalent, being accepted indiscriminately?

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Mere approximation between the moneys of two nations is rather a difficulty than an advantage in regulating exchanges. The larger the disproportion between two monetary units, the more easy it is to adjust the exchange between them.

44. In a Decimal System any one of several moneys of account can be treated as a unit, and Arabic notation expresses the cumulative number of such units in any given sum.

45. What is here called "keeping accounts in farthings reduced 4 per cent." may be also termed keeping account in the legal monetary integer, produced decimally to the smallest coin required, and comprehending every pre-existing coin needful to be retained.

46. The notion of reconstructing the coinage on the basis of a penny, a comparatively modern token, seems altogether untenable. It would confessedly "extinguish" the pound sterling as well as the shilling.

47. There is no objection to writing a fraction at any stage, provided the so doing be optional and not unavoidable.

It is true that however small a coin be provided, the chaffering of the market will "split the difference." There could be no objection to representing 5 mils by "$\frac{1}{2}$" of the next high grade, as in the United States, so saving a column of accounts. In Holland the half-cent is recorded thus, 22^{v} (22 $\frac{1}{2}$ cents).

48. The conveniences of the decimalized pound will be found far to outweigh imaginary inconveniences.

49. Half measures would in this case be found less expedient than comprehensive ones. Any plan whereby £1, £$\frac{1}{10}$, and £$\frac{1}{20}$ must be represented by 240, 24, and 12, is objectionable.

50 and 51. Whereas £ *s. d.*, omitting farthings, are inevitably three moneys of account, the decimalized £ can, if preferred, be treated as £ and mils only (*e. g.*, Portuguese milreis and reis, or Norwegian species,—dollars and skillings, 120 to the dollar), or as £ and cents, recording the half-cent or not at pleasure.

So long as a line sufficiently distinctive separates the £ from inferior denominations, it will be immaterial how many columns follow that line. In some countries faint lines separate every decimal gradation both right and left of the principal demarcation,—a plan which prevents errors of position, and facilitates addition by convenient breaks.

52. We have at present three compartments for accounts. Even when we do not record fractions of a penny, provision is made for four places of figures after the £ integer,—viz. two for shillings, which may be 10 to 19, and two for pence, which may be 10 or 11. Anciently £2 2*s.* 2*d.* was written £2 02 02, and even then the 4th figure after the £ was no lower in grade than $\frac{1}{2400}$, whereas by the third figure after the decimalized £, we can attain as low as $\frac{1}{1000}$. It is difficult to comprehend the objection to more than two figures after the £ integer. At present that stage is $\frac{1}{20}$, on the Decimal System it will be $\frac{1}{5}$ of $\frac{1}{20}$.

53. The inference to be drawn from the facts recorded in this question are, that whatever be the forms prescribed theoretically, decimal accounts have an elasticity which admits accommodation to all circumstances.

Francs and dollars are occasionally divided into thousandths, and so represented not merely in accounts, but in negotiable instruments. Illustrations of this might be multiplied.

The American quotation of sugar at $10\frac{1}{8}$ per lb. is obviously identical with $10·12\frac{1}{2}$ per cwt. of 100 lbs. or $101·25 per 1,000 lbs. On the £ *s. d.* system, $5\frac{1}{16}$*d.* per lb. would be entered at £2 2*s.* $2\frac{1}{4}$*d.* per 100 lbs. or £21 1*s.* $10\frac{1}{2}$*d.* per 1,000 lbs. That these rates are equivalent is not obvious, for the digits are not identical as on the Decimal System. Hence the Decimal System affords every facility to binary subdivision, while, on the contrary, the £ *s. d.* system affords no facility for expression or subdivision decimally.

54. The retention of the pound sterling as the principal money of account, if seriously threatened, would claim a more circumstantial justification.

Its subdivisibility into 1,000 parts is an advantage to be desired, not an inconvenience to be avoided. Where the 5 mil piece or $\frac{1}{2}$ cent. is the smallest amount recorded, the broken parts of the £ will be 200 only.

55. It will in nowise affect "the middle and lower orders," whether there be or not a resemblance between Decimal Coinage here and in foreign countries. Very few of these classes have any concern in foreign accounts.

It is probable that those who now keep accounts in shillings and pence, will hereafter keep them in florins and hundredths.

56. It is undoubtedly true, as here stated, that the high value of the £1 integer is a source of great convenience and advantage, facilitating a conception in the mind of large values, and the expression of them in fewer figures and fewer words than is elsewhere possible.

57. By a further decimalization of the £1 integer those conveniences and advantages will be confirmed and extended.

The best form of expressing the rate of exchange between the two countries is in so many small units for a large one. Our £ being conveniently the largest unit is generally employed in exchange computations, *e. g.*, 25 fr. $27\frac{1}{2}$ per £. Where the units approximate each other in value, that circumstance, far from being a convenience, is a snare to the ill-informed.

The tendency to adopt a large value with which to compare dissimilar ones of smaller magnitude may be thus illustrated :—

At Frankfort, which may be considered one of the great clearing-houses for international finance, the exchanges are quoted at so many florins for 60 Prussian thalers, for 50 Bremen thalers, for 100 Hamburgh marcs banco, for 250 Milanese lira, and for 200 French francs. Even with London the exchange is quoted at per £10, so as to avoid taking account of non-decimal kreutzers.

It is far more easy to conceive the ratio of a franc to £ (to-day quoted $25·27\frac{1}{2}$ short), than of the franc to 10 pence, which is $\frac{25·27\frac{1}{2}}{24}$ to 1, or 1·05296· to 1. Moreover for any decimal part of £ the same figures express the precise equivalent.

Notwithstanding the fragmentary character of our present monetary system, a considerable

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number of arithmetical operations, which would otherwise require a reduction of £ *s. d.* and *qr.*, into the lowest denomination at starting, and the converse process at the end, are now habitually performed by expressing sums less than £ in decimals of £ (readily done at sight), thus sparing much time, labour, and risk of error. Besides the printed tables of decimal money used by various professions, others, for instance dealers in the public funds, construct elaborate tables in manuscript, decimal throughout.

Even bullion computations, whether by Bank rate or Mint rate, may be more readily and accurately worked decimally than otherwise. I take advantage of the fact that 4 × £3 17*s.* 9*d.*, or £3·88¾ = £15·55, and I divide by 4 the weight, now always expressed decimally (notwithstanding the correspondence in divisibility between troy weight and the coin minted by it,) and work the same by practice.

	oz.	
	4)7846·496 @ Bank rate.	
10	19616·24	
5·	9808·12	
·5	980·812	
05	98·0812	
£15·55	£30,503·2532	= £30,503 5*s.* 0¾*d.*
Add for 025	49·0406	
£15·575	£30552·2938	= £30,552 5*s.* 10½*d.* Mint rate.

To find how much foreign money is equivalent to £ *s. d.* up to any amount, the shillings and pence are decimalized as a matter of course.

For £4,567 17*s.* 6*d.* how much French money at 25fr. 27½? I work the question thus:

There is a conventional "par of exchange," 25 fr. to the £, and the smallest gradation of fluctuation is 2½ centimes per £. Now at this fictitious "par" £4 = 100 fr., and 4 × 2½ centimes = 10 centimes per 100 fr. or 1 per mille (1000).

4 × 25 fr. 27½ = 101·1. Consequently,

4)£4567 875

100	=	114196·87½
1	=	1141·96⅞
0·1	=	114·19 11/16
101·1	=	fr.115453·04

The converse operation is as easy, and gives the result £4567·875 = £4567 17*s.* 6*d.*

Fluctuations of 1 per mille are exceedingly convenient, and when our £ is millesimized, both our domestic and our foreign commerce and finance will be simplified and facilitated.

The most sensitive of all markets, bullion, is regulated at per mille, others at per cent., notwithstanding the non-centesimal character of our money.

58. *Vide* preceding answers. "Clean fractional parts" are not the be-all and end-all of a monetary system.

59. *Vide* the accompanying paper from the "Banker's Magazine" of 12th May, 1855, on "Decimal Coinage as a banker's question."

It is probable that many will voluntarily omit from their cheques fractions less than $\frac{1}{100}$ of £ or $\frac{1}{5}$ of a shilling. But even though the shilling be as frequently broken into tenths as it used to be into twelfths (not at all likely), the saving of figures in recording sums less than £1 will nevertheless be between 5 and 6 per cent.

DECIMAL MONEY AND ACCOUNTS, AS A BANKER'S QUESTION.

By J. A. Franklin, Esq., *Public Accountant and Auditor.*

There prevails a tendency to complicate what is after all a very simple proposition—to decimalize or adapt to the operations of common arithmetic our monetary system, based upon its firmly established unit—the £ sterling.

The subject might be usefully treated in several chapters, *e. g.* the schoolboys' question, the hucksters' question, the workmen's question, the fiscal question, the foreign-exchange question, &c. &c. The following observations are in response to an invitation to give a brief exposition of the bankers' question.

I. It is proposed that the smallest money paid or received by bankers—heretofore one penny, = £$\frac{1}{240}$, shall, by concert, be fixed at £$\frac{1}{200}$ = $\frac{1}{10}$ shilling = 5 mils, mites, new farthings, or however named.

II. Copper coin (pence and halfpence) might then be dispensed with; inasmuch as a half-shilling (25 mils) exchanged against two 10-mil pieces (20 mils) leaves a difference of five mils.

III. Cashiers would save time, labour, and risk of error, in respect of sums or parts of sums less than £1; inasmuch as the variety of such sums possible would be only 199, instead of 239 as heretofore.

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IV. Bankers' coins of change could, eventually, be reduced to five varieties,* ranged thus in the till :—

Tenths Florins 100 mil coins.	Hundredths Cents 10 mil coins.	Thousandths Mils.
(½ Sovereigns.) pcs. of 5 florins.	(Shillings) pcs. of 5 cents.	(½ Cents) pcs. of 5 mils. (1-10th Shilling.)
pcs. of 1 florin.	pcs. of 1 cent.	

V. Clerks, accountants, &c., would have their labours diminished and facilitated; inasmuch as 608 figures are required to express, by gradations of one penny, the possible variety of sums (239) between £ and £; whereas 478 figures suffice for the 199 decimal gradations of 5 mils.

VI. Interest calculations would be materially simplified; *e. g.*, the single group of figures (275) in a table, suffices to represent the several sums £0·27,5 (5*s.* 6*d.*), £2·75 (£2 15*s.*), £27·50 (£27 10*s.*), £275, £2,750, &c. &c. Where the interest is actually calculated, and only tested or checked by the table, the operation is obviously still more facilitated.

The Foregoing Propositions Illustrated.

I. The difference in value between $£\frac{1}{240}$ and $£\frac{1}{200}$ is only $£\frac{1}{12\,000}=\frac{1}{60}$ shilling$=\frac{1}{5}$ penny. The difference between a farthing and a mil is $\frac{1}{100}$ of a penny exactly.

II. Suppose a term fixed for the obligatory circulation of the 4-penny and 3-penny pieces at their original value ($£\frac{1}{60}$ and $£\frac{1}{80}$ respectively), except in payment of revenue they could afterwards pass current for only $£\frac{1}{100}$, a "cent," "ten," "piece of ten" (mils).

The new piece of that denomination might, by the present standard, weigh $17\frac{5}{11}$ grains gross, and contain $16\frac{8}{55}$ grains of fine silver. The apprehension that it would be inconveniently small is disposed of by the practical experience of the United States, which, for similar reasons having, in 1851, made the 3-cent piece weigh $12\frac{3}{8}$ grains gross (assay $\frac{3}{4}$ fine), reduced in 1853 its gross weight to 11·52 grains (assay $\frac{9}{10}$ fine); thus increasing its intrinsic value while diminishing its size.

III. There are various methods of arranging the decimalized money columns; *e. g.*, £14·72,5 (£14 14*s.* 6*d.*) may be represented at pleasure ‖£14 | 725‖, ‖£14 | 72 | 5‖, ‖£14 | $72\frac{1}{2}$‖ just as $\frac{1}{2}$ centimes are quoted in French exchanges, or ‖£14 | 72ˇ‖, with such a mark as the Dutch use in recording a half-cent; and there are other alternative methods.

IV. Nothing needs to be prejudged; but if expedient, the "five" ($\frac{1}{2}$ cent, $\frac{1}{10}$ shilling, $£\frac{1}{200}$,) could be struck in a new metal, obviously unlike silver or copper, and about the size of a thick farthing.

V. The following tables illustrate the economy of figures under the decimal system :—

Gradations of One Penny,
240 in £1.

£	s.	d.	£	s.	d.	£	s.	d.
							16	
...	...	1	...	4	...	...	16	...
...	...	2	...	4	1	...	16	1
...	...	3	...	4	2	...	16	2
...	...	4	...	4	3	...	16	3
...	...	5	...	4	4	...	16	4
...	...	6	...	4	5	...	16	5
...	...	7	...	4	6	...	16	6
...	...	8	...	4	7	...	16	7
...	...	9	...	4	8	...	16	8
...	...	10	...	4	9	...	16	9
..	...	11	...	4	10	...	16	10
			...	4	11	...	16	11
	13 figures			25 figures			37 figures	

Of these specimens	1 col.....	13 figures	13
	9 „	25 „	225
	10 „	37 „	370
	20		608

* These coins equally suit those who fancy to keep accounts by making a unit of the ½ sovereign, the florin, or the shilling.

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GRADATIONS OF 5 MILS,
200 in £1.

£	100ths	1,000ths
...	...	5
...	1	...
...	1	5
...	2	...
...	2	5
...	3	...
...	3	5
...	4	...
...	4	5
...	5	...
...	5	5
...	6	...
...	6	5
...	7	...
...	7	5
...	8	...
...	8	5
...	9	...
...	9	5

28 figures

£	100ths	1,000ths
...	40	...
...	40	5
...	41	...
...	41	5
...	42	...
...	42	5
...	43	...
...	43	5
...	44	...
...	44	5
...	45	...
...	45	5
...	46	...
..	46	5
...	47	...
...	47	5
...	48	...
...	48	5
...	49	...
...	49	5

50 figures

Of these specimens 1 col..... 28 figures.
9 „ 50 figures... 450 „
10 478

The saving of clerical labour, 130 in 608, would be enormously greater if parts of a penny, 960 per £, each requiring 3 marks of the pen (*e. g.* $\frac{3}{4}$), were compared with the single figure which serves to denote $£\frac{1}{1000}$.

VI. *Vide* Laurie's Interest Tables (18th edition).—Taking £275, the lowest amount among the examples in § VI., the interest for which can be gleaned by addition only. We find the interest for 121 days at 4 per cent. is £2 13*s.* 0½*d.* + 19*s.* 10½*d.* = £3 12*s.* 11*d.*; whereas decimal tables might give the interest £3·64,6,—figures available for any of the sums expressible by 275.

Even though the interest were culled in two items; *e. g.*, 2·652 + ·994 = £3·64,6, would be a notable saving in figures.

60. *Vide* preceding answers.

61. *Vide* preceding answers.

62. To declare $£\frac{1}{40}$, the half-shilling, equal to 6¼ old pence, could occasion the loss of the farthing to him who might neglect to exchange his "sixpen'orth of ha'pence" for new coinage. Few of the working classes keep any store of copper coin; their wages are principally paid in silver coin, and some are rather likely to mistake the alteration as a gain of a value in their shilling. The small coinage has been reduced in other countries even beyond 4 per cent. without difficulty or discontent.

63. The advantages of the change to the lower classes will be manifold. It is the shilling which is their familiar measure of value; copper money, which they call "ha'pence," is but change for their shilling.

64. By decimalizing we get rid of complexities more easily mastered in written accounts than by mental reckoning.

65. Even though all the merits claimed for the system of £ *s. d.* and *qr.* were conceded, and if some of the inconveniences apprehended were not supposititious, it would in my opinion be nevertheless prudent, just, and expedient to carry out the decimalization of our coins and accounts through the single stage which now breaks the harmony.

These questions do not touch upon the immense advantages of the change from an educational point of view.

Precious hours are now wasted in schools, from which the children of the masses are all too soon withdrawn, upon irksome lessons and distasteful exercises; hours thereby lost for that ethical and intellectual training, the deficiency of which is visited upon society at large.

It may be pleaded for Decimal Coinage, that it will essentially serve the classes who "live from hand to mouth," by supplying the instruments whereby their expenditure in detail may be measured out with a degree of intelligence and economy not otherwise available.

It will accomplish no less for the warehouse, the shop, the counting-house, and the bank, sparing time and labour for more productive employment, and diminishing risks of error in computation to an enormous extent.

International commerce will in like manner be facilitated when nation can speak to nation concerning the objects of peaceful interchange in the only common language yet extant—common arithmetic.

J. A. FRANKLIN.

Warnford Court, 6 June, 1857.

(Communicated by Lord Overstone.)

S. A. GODDARD, Esq.

S. A. Goddard, Esq.

Answer to Question 1. I think the florins should be called in, being of no use, and inconvenient; often mistaken for half-crowns, and no handier than two single shillings. I have never met with anyone who thought them any convenience. I think gold five-shilling pieces in flat rings would be useful. I do not think any other change of the coins or any other new coin necessary.

If a decimal system of accounts be adopted, I would issue Victorias, or 100 pence pieces, and double and quadruple Victorias, as the money of account; or I would use crowns as the money of account, continuing the sovereign as a coin of four crowns.

2. I do not object to the present system of coins. I object to the florin for the reason above stated.

3. I do not object to them at all. I consider them more convenient than decimal coins for retail transactions and for most trade transactions; but I think a decimal system of accounts the most convenient, and that it may be introduced without any change of coins,—certainly with no material change.

4. For market transactions and the daily purposes of life. Not to facilitate accounts. 1,000 half pecks of potatoes are sold for coin and paid for in coin to every transaction in cotton. The time of the person buying the potatoes is of as much consequence to him as that of the person buying the cotton to him; besides, he is not so quick at reckoning, and cannot overcome a difficulty, and moreover the cotton is not paid for in coin after all. The value of 1,000lbs of cotton is, however, easier reckoned at 10 cents than at *5d.*

5. Unquestionably the million must be considered in preference to the thousand. But, if not, there is this practical difficulty,—the million will not be sacrificed—no law will effect it. Two things will prevent it, either of which would be effectual; viz., their will, and the impossibility of their falling into the system, even if willing.

6. *a.* Certainly it must. I have fully stated this in writings on the subject. This consideration is indispensable.

Never heard any complaints except of florins, and that fourpenny and threepenny pieces cannot be readily distinguished. However the smooth edge of the one and the milled edge of the other mainly prevent the inconvenience.

b. Most unquestionably. This I have distinctly stated in writings on the subject. But I think both may be accomplished with ease if it be thought desirable to introduce a Decimal System into accounts.

7. No. But I suggest that the Decimal System may be applied to our money and used in accounts.

8. The decimal parts are infinite, but the even fractional parts that can be found under a decimal system are less in number than can be found under the present system. As fractions of duodecimals are better adapted to the present system of weights and measures, and to dozens and grosses, than decimal parts, so that system must be more convenient than a decimal system. Indeed, I think it is more convenient than the Decimal System would be even under a change of weights and measures.

9. *a.* Experience shows this to be true. The universality of the use of 12, and of its divisions into halves, quarters, &c., goes far to prove its superior fitness.

b. I doubt whether any time is really lost at schools through the duodecimal system. I think the minds of boys require a more severe training than the decimal system alone would give, and that the duodecimal system exercises the mind more, requires the use of the "imagination" and "memory," and consequently assists both. Were everything counted and weighed by tens it would not even then be so easy to use $\frac{1}{10}$, $\frac{1}{5}$, $\frac{3}{10}$, $\frac{4}{10}$, &c., as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, &c.

c. I had made this same remark in writing on the subject, in reply to what teachers have said in favour of decimal teaching, without knowing that the opinion had been advanced by anyone.

d. I do not see any fallacy in these considerations.

10. I think this cannot be doubted. It unquestionably is so.

11. Not less favourable to readiness and ease to begin with, but the other plan trains the mind more, and soon gives the mind greater power, and also trains it to distinctness and exactness. This I had written in opposition to the notion of teachers that time might be profitably saved by adopting decimal calculations universally.

12. *a.* I consider the mil system so thoroughly objectionable as not to demand attention. Were society to start anew the third column would be as easy as the first, but as persons are used to the first, that would come easiest to them. Nothing short of sweeping away all present coins and weights and measures, and the adoption of the decimal system generally, would induce the community to fall into new modes of reckoning in daily transactions. The old form must otherwise be tolerated, for it will be practised.

b. I have shown in my writings that the mil system never would nor could be practised in the daily retail transactions.

c. Yes; but especially to those used to it.

d. No. This I have shown in writings, and no practice would make it easy.

e. Yes.

f. Were decimal money adopted while weights and measures and dozens and grosses remain, calculations would be continued as at present. Sums would be worked in shillings and pence, and then turned into the money of account. This is the practice in America after 60 years of trial, with the simplest possible decimal money, and without any shillings or pennies.

There is a coin, a Spanish eighth, called, in New York state, a shilling; but this is accidental, and had little or no influence in continuing the custom of reckoning in shillings and pennies.

10 boxes at 5·50 $55·00 would be easily reckoned.

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10 boxes at 22*s.* £11., about as easily reckoned.
But $5\frac{1}{2}$ boxes at 5·50 not quite so easily as $5\frac{1}{2}$ at 22*s.*

g. The mil system, for the ordinary transactions of life, is an impossibility; and were it not, society would not adopt it.

13. *a.* Were everything dealt with decimally, decimal fractions would not be as convenient as vulgar fractions.

That is the object, and the division of money should correspond with the division of things that money is to pay for, if possible.

b. It is unnecessary to say there could hardly be a better opinion. But it appears to me that decimals are better adapted to "numeration and multiplication." I think decimal computation not so well adapted to the "breaking up" of things, but I think it better for accounts.

14. *a.* The first column is simplest, the second impracticable; the third would be inconvenient unless the unit of account should be expressed by 100.

The third column would be as easy as the first were the money of account dollars and pence, for then the statings would be $2·40, $2·12, &c., whereas with pounds as the money of account, we have to find the number of pence in 17*s.* 8*d.*, and then put down 212. 1,044 would be readily paid with present coins if we had a hundred-penny piece called a "Victoria:" it would read 10·44—10 Victorias 44 pence (or 3 shilling pieces, 6*d.*, and 2*d.*) This would be the best decimal money that could be adopted for accounts (viz., 8*s.* 4*d.* Victorias and pennies) but for the fact that Victorias would not be an aliquot part of a sovereign, and therefore 10·44 could not be readily turned into pounds, nor 4*l.* 7*s.* into Victorias, and sovereigns would have to be called in; whereas, were the crown adopted as the unit of account, it could be readily turned, 4*l.* 7s. × 4 = 17·40, or 10·44 ÷ 6 = $17·40; *i. e.*, divide by 60 less 0, done mentally.

b. The shilling and pence system is most convenient.

c. The addition of 40 mils to the pound destroys exactness, and prevents divisibility; in fact, the 1,000 mil pound and the 940 mil pound represent respectively the decimal and duodecimal systems.

15. These propositions appear to be self-evident, and to require neither affirmation nor denial.

There would be a "world of trouble" in altering present price books into mils, and when done they would be utterly perplexing, and to most persons unintelligible. The books of some manufacturers have 50,000 prices in them. It would be nearly an impractiacble task to change them to mils, and when done their use would increase the trouble tenfold.

		s.	*d.*	£	*s.*	*d.*				
Reckon	5 doz.	2	6	0	12	6	*or*	5	125	·625
	6 „	3	0	0	18	0		6	150	900
	8 „	3	6	1	8	0		8	175	1,400
	10 „	4	0	2	0	0		10	200	2,000
	12 „	4	6	2	14	0		12	225	2,700
				7	12	6				7,625

This example by no means exhibits the difference in the labour between the two systems. The mil plan here merely involves the use of about one half more figures, while the main trouble would consist in finding the prices in mils to begin with; and in resolving them again in the mind into shillings and pence, to see if they were about right, which necessity it would require years of practice to obviate.

16. Not into the coinage; but I think it may be introduced into accounts, and the present money be adapted thereto.

17. No; especially as connected with the custom of buying and selling by dozens and grosses, but still accounts may be kept in decimals conveniently.

18. I think accounts may be kept decimally, and the coins used either decimally or binarily, as may best suit the convenience of parties. The use of the two modes appears to give a double facility instead of occasioning confusion. I do not think a change in weights and measures necessary to a trial of the compound system.

19. Not so great, certainly. Coin used decimally would be most inconvenient under the present system of weights and measures, dozens and grosses.

20. *a.* Unquestionably. Decimal reckoning would not even then be made in buying and selling except with some particular articles. Shillings and pence are used, for the most part, in the American States in reckoning, although there are no shillings nor pence; but before payments are made the sum is turned into dollars and cents. They say "6 at 3*s.* 9*d.* is 22*s.* 6*d.*, and that is $3·75, New England (or $2·81¼ New York). They never say in shops "6 at 62½ cents; but the practice prevails to some extent of selling agricultural produce in dollars and cents.

b. Beef is sold at 10 cents, potatoes 50 cents, flour $6, &c.; and reckoning in these instances is very convenient, and payment in decimal money easy, for the value of the cent is not so small as to occasion a multiplicity of figures; but even in this case 9 bushels at 75 cents would not be reckoned 9 × 75 = $6·75, but 75 cents would be called 4*s.* 6*d.*, then 9 × 4*s.* 6*d.* = 40*s.* 6*d.* = $6·75, done mentally and more readily than 9 × 75. This mode of using two denominations of money to obtain the result is curious, but it continues after 60 years' practice, and this in itself goes to prove that the contraction of sums into shillings is more convenient than to reckon them in cents.

21. Not with present practice, but under a Victoria and penny system would be done very readily with present money. The mode, however, would not be practised.

22. That the Decimal System is best adapted to accounts, I think, can hardly be questioned; less trouble, correctness more readily ensured, and greater facility in reckoning interest. I think it may be adopted without altering the coins, still allowing the old system to prevail in marketing, shopping, and in manufactories, &c., &c., in buying and selling.

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25. *a.* It is a mere waste of time to talk of dividing the unit money of account into 1,000 parts. Whatever else is done, it must be divided into 100 only, with 100 steps, and there must be but two columns of account, and there should be but two rows of figures in the right-hand column. The mil system would disgust the whole community in less than twelve months.

b. The inconvenience and not the loss is to be considered. The working classes would gain as much as they would lose.

c. This is not correct in any one respect. The Spanish money was not adopted for the purpose of the $\frac{1}{4}$ and $\frac{1}{2}$ cents; on the contrary, those fractions are always lost on the small sums. The Spanish money was in the country and had been used, and this use was simply continued. The United States Government adopted the Spanish money as their money and legal tender until time would permit them to coin for themselves. They found dollars, halves, quarters, eighths, and sixteenths, and used them; but instead of the eighths and sixteenths saving fractions, they cause the loss of fractions. Two eighths or four sixteenths will pass for 25 cents, or a quarter of a dollar, but one eighth will only pass for 12, and a sixteenth for 6. Should a boy buy a cake for $\frac{1}{2}$ cent, an eighth, 12$\frac{1}{2}$-cents would not be taken and 12 cents given in change, but 12$\frac{1}{2}$ and 6$\frac{1}{4}$ will be taken for 19 cents.

No purchase is made for less than a cent. There may be two cakes for a cent, then a boy would pay a 12$\frac{1}{2}$-cent piece, and receive back 11 cents. He would avoid this payment if he could, and keep two eighths to pass for a quarter or 25 cents, but this shows that fractions are lost and not saved by this division of coins.

d. Not illegal coins; Spanish dollars were a legal tender, and also all parts of Spanish dollars —See Q. 24, 5th line from bottom.

e. The answer to the question is, that decimal money could not be applied to the present system of weights, measures, and modes of computation with any degree of convenience. Could it be, the loss of fractions would be immaterial; as much would be gained at one time as lost at another, and people would invent and practise modes that would overcome, mainly, the difficulty.

24. I do not see that "nature" has much to do with it. Quantities and lengths are halved, quartered, &c. because these portions can be compared with their fellow portions.

a. I imagine this to be the true system of action; viz., the Decimal System for accounts—the coin and reckoning as at present; but final amounts, when put on paper, to be stated decimally.

b. Not the most useful and convenient, because they represent $\frac{1}{2}$ cents and $\frac{1}{4}$ cents, which fractions, as before said, are always sunk except when two or more are paid together; but because of their universal use, there not being enough dimes and half dimes for use. I believe the Spanish money has been declared, say in 1856, no longer a legal tender. 10-cent and 5-cent pieces are quite as handy and useful as 12$\frac{1}{2}$ and 6$\frac{1}{4}$; and more so, as they do not lose the fractions.

25. Question means,—Is the convenience of the common purposes of life the best criterion? Unquestionably, these transactions are as 1,000 to 1 of others; but *where* the right of suffrage is denied, it can hardly be held that one man is as good as another, and his convenience as much to be studied. Education and the working man's good are *now* fashionable topics; 50 years ago they were ultra-radical.

26. Where does the misfortune lie? with decimals or with the system of weights and measures? The question is, whether the benefit to be derived by introducing decimal weights, &c. would more than counterbalance the "misfortune?" My opinion is, that decimals for accounts, making 100 the exponent of the unit of value, with the present system of coins to be used decimally, only when people find it most convenient to so use them, is the proper mode to adopt.

27. *a.* Society could be re-constituted with less trouble than this would be accomplished:

If a pure Decimal Coinage be essential, then it is essential to decimalize weights and measures; and could all be done at the same moment, that would be best, were the change not too great for the people to act upon. I think it would occasion universal confusion.

b. If adopted at all, it should be first, as the risk of a sudden entire change would be too great.

c. If a change be made, the Decimal System should be introduced into accounts first, and the present coins used decimally so far as persons might choose to use them, and no further. A trial of this plan would involve no expense, nor any inconvenience; and if it did not answer, a change back to the old system might be made with but little trouble. Tons might be called 2,000lbs., and cwts. 100lbs. (afterwards); but pounds must always be divided into halves, quarters, eighths, sixteenths, &c.; they could not advantageously be divided decimally. I am therefore of Mr. Airy's opinion, so far as I understand it; but I would introduce the Decimal System to money transactions only partially.

28. *a.* Question not very clear; but, so far as understood, yes.

b. Yes.

c. That is represented to be the great advantage, but I believe if everything were decimalized that calculations would still to some considerable extent be made by the rule of "practice." Therefore I think a combination would be useful of decimal accounts and the present system of weights and measures and coins. I believe that the universal application of the duodecimal system to money, weights, and measures better, on the whole, everything considered, than the universal application of the Decimal System to money, weights, and measures would be.

d. This calculation is made in 39 figures, discarding fractions. Under the decimal plan it would take 47, as follows:—

483597
4275

2417985
3385179
967194
1934388

2067377175 47 figures.

e. This calculation embraces 74 figures. It may be done in 48 figures, as follows :—

9576	
215	
47880	
9576	
19152	
4788	
2394	
957	
239	
120	
30	
9	
2067377	48 figures.

f. Nothing gained in any case.

29. *a.* The introduction or application of the Decimal System to accounts will not render a change of weights and measures necessary. Nor will the application of the present coins to decimal computations, leaving them to be used as shillings and pennies when found to be most convenient so to do. Were it possible to hit upon a decimal plan, pure and simple, that the people would adopt universally, then it would doubtless lead them to demand the decimalization of weights and measures ; but I do not consider that possible.

b. Unless in very small transactions, half-cents are not put down in money columns at all.

30. When would this be done generally? Never, until shillings and pennies should be abolished, and all weights and measures decimalized, and even then it is altogether doubtful whether it would equal the present system for convenience. My impression is that it would not. Moreover it would be a most laborious matter for a nation to effect such a change. It would take two generations, and be productive of great discontent and dissatisfaction.

31. Decimal money pure and simple would no doubt tend to induce the adoption of decimal weights and measures, but not if it be applied to accounts only.

32. It should be determined in the first instance how far the Decimal System is to be carried, and then whatever step is taken should be adapted to the ultimate system. Undoubtedly a system should not be adopted that is not applicable to a convenient system of weights and measures. Whether one should be adopted not applicable to the most convenient system of weights and measures, depends upon the amount of the advantage in other respects, by such adoption.

33. I do not see how this conclusion can be avoided.

The "conclusion" is, that it may well be doubted. I think it cannot be doubted that the loss was more than the gain.

34. *a.* I think this tendency very much the result of education and practice, but no doubt the natural tendency is to halve quantities and amounts. Half may be ascertained by its equality to its fellow half, and by that means the lowest subdivision may be obtained.

b. Without knowing these facts, and without having seen this opinion, I had formed the same opinion.

35. *a.* Yes ; but it does not follow that the integer should be pounds.

I think it convenient that the coins should remain as they are, except that the unit should be a Victoria, or 8*s.* 4*d.*, and 100 its exponent. I would write V. 25·50.

Turn 25·50 into £ = 10*l.* 12*s.* 6*d.*, done mentally, by deducting one sixth from 24, leaves 20 ; half that is 10, and 150 pence is 12*s.* 6*d.*

Turn 10*l.* 12*s.* 6*d.* into Victorias; add $\frac{1}{5}$ to 10 = 12; double that is 24, and 12*s.* 6*d.* is 150 pence or 25·50. There would be some little trouble in turning from one to the other ; and as 8*s.* 4*d.* is not an aliquot part of a sovereign, the sovereign could hardly be continued in use. These are the objections to the adoption of the Victoria and penny system for accounts, leaving all ordinary transactions to be conducted in shillings and pence.

8 doz.	-	8*s.* 4*d.*	would be	8 doz.	-	100	- 800
6 yds.	-	4*s.* 2*d.*	„	6 yds.	-	50	- 300
24 gross	-	16*s.* 8*d.*	„	24 gross	-	200	- 4,800
							5,900

b. I very much prefer, however, crowns and hundredths, because the crown is an aliquot portion of the pound, and consequently the present sovereign and bank bills could be readily counted and estimated in crowns and vice versâ.

36. *a.* There is a great deal of nonsense in this paragraph. Whoever thought of dividing the eighth of a dollar into sixths, quarters, and thirds—no one, ever. It should have read thus :— "The Spaniards found it convenient to issue halves, quarters, eighths, and sixteenths of dollars; and this money being plentiful in the States, and there being none other, Congress made it a legal tender. Moreover, as the Americans had always been used to reckoning by shillings and pennies, a custom borrowed from Great Britain, they continued the practice, and as it so happened the Spanish eighths corresponded to the New York shillings of eight to the dollar, that was found to be a further convenience."

b. It will be noticed that Mr. Leavitt speaks of pence (inadvertently), although there is no such coin.

The fact that the Americans, after sixty years' practice with decimal money and accounts, continue to reckon in shillings and pence, although they have no coins by those names, shows at least the force of habit, and how impossible it would be to get a people, having shilling and penny coins,

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to give up reckoning with them. It also shows that it is essentially convenient—habit out of the question.

c. Answered by foregoing.

d. What system—the mil system? No. Under any Decimal System? No.

To issue coins of those denominations would be a departure from the Decimal System; and to reckon by halves, quarters, &c. would be equally so.

e. No class of persons will lose more than it will gain.

f. No; it will be of no loss of any importance to any one, but it would be a subject of annoyance and dissatisfaction, because people are annoyed at what appears to be a loss, and the loss is not compensated in their minds by similar gains. Probably no person in all America loses a dollar a year by losses of $\frac{1}{2}$ and $\frac{1}{4}$ cents on eighths and sixteenths of dollars; as much is gained at one time as lost at another.

g. The inconvenience is simply that of the annoyance from the want of exactness. Disregarding small differences is fallen into with complacency, and is therefore no material inconvenience.

h. The community will not apply the decimal principle (exclusively) to buying and selling They will use it when it suits them best, but will use the present mode when that suits them best There will be no use in trying to force them; they never will adopt it.

The people will not reckon by 48 mills.

37. *a.* Mr. Leavitt had great experience, and his statement appears to be quite in unison with the facts.

b. I have not seen Mr. Leavitt's Report, nor that to the Canadian Legislature, but I had come to the conclusion that this would be the proper method, viz., to introduce in connexion with present coins, some means by which money transactions may be recorded in a Decimal System of notation.

I think the present system of money far preferable to an exclusively Decimal System.

38. *a.* My reply to the three first question is, yes.

I do not think the easiest plan always gives eventually the greatest facility. The mind gets careless over an easy matter, where it will overcome and master a difficulty, and then be perfect in it.

I think this arises more from practice than natural tendency. People halve because half can be arrived at by comparing it with its fellow half.

39. *a.* I think the adoption of twelve scientific. That of twenty accidental and unscientific.

b. In the adaptation of twelve to divisibility; and this divisibility being concurrent with that of weights and measures.

40. This necessarily follows so far as twelve is concerned, but not in respect to twenty, that I can see; but perhaps the twenty does not militate with the convenience of the system.

41. *a.* A decimal division for accounts, and the present mode of computation for trafficking, would be the best plan.

b. Take crowns for the money of account: $\frac{1}{3}$ would be 1*s.* 8*d.*, $\frac{1}{6}$= 10*d.*, $\frac{1}{12}$ = 5*d.*, $\frac{1}{16}$ =3$\frac{3}{4}$*d.* Calculations would be made in shillings and pennies, and turned into decimal money when written thus,—

		s.	*d.*		£	*s.*	*d.*
12	×	4	6	=	2	14	0
6	×	9	0	=	2	14	0
3	×	18	0	=	2	14	0
					8	2	0

× 4 $32·40, changed mentally.

42. If any change be made, it should be this (with the aid of a new value to the unit of the money of account), viz., retain the present coins, and the present modes of computing them, introducing a mode of computing them decimally, when such computation should be more convenient, which mode should also be applicable to accounts.

43. *a.* The money of account must be represented by 100. We cannot estimate the value of 465 pence without turning the sum into pounds. 465 could not be paid with our present coin without much trouble in ascertaining what coins would come to that. It should read 4·65 or 4 Victorias 65 pence.

Unless the integer of the money of account can be represented by a coin, the exponent of which shall be 100, I would sooner leave it as it is. To write down pence, and deal in either pence or pounds would be, I conceive, a very clumsy, patchwork, unscientific mode. I think it would be ridiculed by France and America.

b. The pound should be a multiple of the 100, if the sovereign is to be retained as coin, and the present bank note is to be retained; 100 halfpence, called a dollar, will never do. It would have many practical inconveniences. The pound would be no multiple of it; all sums reckoned in pence would have to be doubled; it could not be turned into pounds readily, nor pounds into it.

The fact of 100 half-pence being equivalent to the American dollar has charms for some persons, but there is nothing in it. The value of the American coin has been altered several times, and may be again, and it is of the smallest possible consequence whether our money of account be of the same value as the American or not. Besides, the value of the dollar is not $\frac{100}{120}$ of the crown, but $\frac{110}{120}$; in fact, the value of the silver dollar is 4*s.* 7*d.*, not 4*s.* 2*d.*, in silver. There is, however, about the same value of gold, say quantity of gold, in 4*s.* 1$\frac{1}{5}$*d.* English gold, that there is in the American gold dollar; *i. e.* silver against silver the value is about 4*s.* 7*d.*, gold against gold 4*s.* 1$\frac{1}{5}$*d.*

44. I know of none other than taking the lowest in use. The lowest unit in the States is a mil, but it is discarded; a cent is taken, and all sums read in cents, viz., $199·99 or 19999 cents.

45. *a.* I do not think that adding 40 to the number of farthings in the pound of the smallest practical importance to anyone. All values would be stated in farthings, but there would be only 10*d.* loss or gain in 10,000*l.*, it being compensated in the increased value of the shilling.

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b. No doubt; but the penny cannot form a decimal part of a pound with 100 as the exponent of the pound, nor would the sum of 100 pence be an aliquot part of a pound.

c. There should be but two columns in accounts, but two denominations, as dollars and cents or pounds and pence. The American system has four, viz., dollars, dimes, cents, and mils, but two only are used.

d. Yes; the contrary plan would never be practised.

e. The dime, also, has been dropped, or rather never taken up; sums are not expressed $9 9d. 9c. 9m.$ but $9·99$, or say $10·00$. Mils, however, are not known by name even.

There are coins named dimes and half-dimes, but they are usually called 10 cents and 5 cent pieces.

46. I consider this would be imperfect and inconvenient. The integer must be expressed by 100 of the lowest money unit. This I regard as indispensable.

The mind could not estimate values expressed in pence, at least without much practice, nor turn a large number of pence into pounds without some trouble.

I do not think it important to retain the pound as the integer, if a better can be found. The crown would be far preferable in respect to its value; it would conduce to economy, and would save largely in the Government expenditure, because notions of value are based very much upon the great unit of account. A crown will be valued under a crown system much higher than it is under the pound system.

Crowns or Victorias, or Victoria pounds, may be adopted. The crown must be accompanied by hundredths, not by pence.

The crown is a better English term than pound. It is more sonorous and aristocratic. "Pound" is very plebeian, in fact vulgar. All calculations or amounts now stated in pounds could be reckoned mentally in crowns, and vice versâ.

47. Quite unimportant. No disadvantage; better than decimals, but halfpennies would seldom be written in the money column.

Vulgar fractions are not so easily added as decimals. But for the most part these fractions are rejected in accounts as unimportant. They should never be introduced in books of account.

48. The mil system is preposterous for a working system; it may look well on paper. The Committee of the House of Commons came to a correct decision, viz., that the pound, if the money of account, under a decimal system must represent 1,000. I think the Committee turned its consideration to the question of how the pound could be divided, and not to what would be the best system of decimal money.

49. Certainly this is what I have recommended.

This will not answer unless we are to deal in pennies as the substantive denomination. It would be a peddling system. It would lower the money system in the eyes of the world, but it would tend to economy. We could not estimate and pay in pounds; we must estimate and pay in pennies—the money of account.

50. I think but two monies of account would be used and spoken of, viz., pounds and mils.

a. Not in respect to there being too many columns of account. There would be but two, but hardly anything would increase the confusion that would be necessarily occasioned.

51. Are not pounds, shillings, and pence three monies of account? or is the dollar one and the pound one, as here meant?

52. Unquestionably. I think this must be taken as the basis of any decimal system; 100 steps, and 100 only.

53. *a.* Dollars and cents only are used in the United States.

Dimes or tenths would occasion trouble without any benefit, and no one cares for mils. Probably not one person in ten knows what a mil means; it is seldom heard of.

b. That practically two columns only are necessary, and that the lower fractions are not worthy of consideration.

c. They indicate that more than two columns are practically useless, even if not inconvenient.

d. This may be said, but the fact is they know about as little of half cents as of mils, except in dealing in valuable articles, as cotton, &c., but in ordinary transactions the half cent is hardly known. Two for a cent, not half a cent each.

e. Its utter uselessness.

f. Here is an instance where the fraction of a cent is used. It is used in this manner, and not in shop and market transactions.

Were the penny to be used decimally cotton would still be sold at $8\frac{1}{2}d.$, $8\frac{1}{4}d.$, $8\frac{1}{8}d.$, and not 8·1, 8·3, 8·5, &c. I suppose this aptness to divide into halves, quarters, eighths, &c., arises from the fact that these may be ascertained in length, distances, &c., by comparison. One can double a string, or halve a quantity, but how can we arrive at one tenth or one fifth of the length of a string or one tenth or one fifth of a quantity? Barbarians would evidently adopt the system of halving because they could compare halves.

g. Cotton may as well rise $\frac{1}{10}$ as $\frac{1}{8}$, and the total value would be as correctly arrived at. The reason is that people are more used to halves, &c. than tenths, and probably because the measure of half, quarter, &c., in lengths, &c., can be exactly determined at once, but not the measure of one tenth or one fifth without extraneous aid.

54. I think in this case the pound must be divided into 1,000 parts, but that pounds and mils only would be written. And as I think the mil system impracticable, the pound cannot be retained as the unit of account under a Decimal System.

55. The integer must represent 100; immense trouble and confusion would be occasioned by its representing 1,000. The lower classes would not compute in mils, nor in florins and mils; and if they could, it would take much longer and be more liable to inaccuracy than shillings and pence.

56. *a.* More convenient than francs, but no convenience nor advantage over dollars and cents. On the contrary, a great disadvantage, occasioning extravagance and universally greater expenditure. I think francs too low.

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b. Crowns carry the value to the mind clearly. The value of 1,000 crowns is as clear as that of 250 pounds.

c. This is an advantage so far as it refers to coins, but none whatever in respect to accounts.

57. The adoption of crowns and hundredths, or Victorias and pence, would occasion no inconvenience in this respect.

a. The high value of the pound, necessitating the use of 1,000 steps, the most advantageous exponent, renders the application of the Decimal System to the pound impracticable even in its most advantageous form. But it does not follow that the Decimal plan may not be applied to some other unit of account.

58. No doubt.

59. I think but two columns would be used, viz., £9 999 mils. This increases the figures in the mil column one half, and consequently interferes with brevity. This column should have but two rows of figures.

60. It would be more inconvenient to deal with a 50 mil shilling than with a 12*d.* shilling.

a. It would be so serious an inconvenience they never would reckon in the Decimal money unless all other money should be called in, and then even they would try to reckon by halves and quarters.

b. This is in accordance with my previous remarks at No. 53. At the time of writing those remarks I had not seen this, but I do not think it is owing to the power of a "glance of the eye," but to the fact that $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ can be ascertained by comparing one portion with another. Double a string and we get half, double it again and we get quarters, and so with quantities; but there is no means of ascertaining $\frac{1}{5}$ or $\frac{1}{10}$ of measure or of length by a ready comparison of one portion with another.

62. *a.* On the crown plan no coins nor bank notes need be changed, and no values would be changed

b. As the people never would reckon in mils they would not suffer much pecuniarily from the attempt to introduce the Mil System.

c. The penny or halfpenny scheme will neither answer. The pound would be no multiple of the integer, and the value of the sovereign would not be obvious at a glance. The 100 penny Victoria would be a good plan were all sovereigns called in and all notes changed to Victoria notes; the 100 halfpenny plan will not do in any way.

63. A mode of keeping accounts decimally would benefit nearly all classes, but mainly bankers, merchants, manufacturers, &c.

64. *a.* It would be unjust to attempt to impose upon the masses an inconvenient system simply to benefit the few. If their ultimate convenience could be shown then it would be justifiable. But by no reasoning that I can apply would decimal money to be used decimally conduce to their convenience, nor to the convenience of anyone, without a decimalization of weights, measures, &c., and even then its utility is rather more than doubtful.

b. They form an insuperable objection to the attempt to decimalize the money computations, but not to the application of the Decimal System to accounts, nor to the present coins being computed decimally when convenience should recommend it.

65. I do not think there is any loss of time by compound arithmetic; it is good and valuable exercise for the mind; and I think the time as usefully spent as in any other mode of calculations for exercising the mind.

I do not think it would be advisable to introduce Decimal Coinage any further than to declare that all accounts shall be kept in Victorias and pennies, or in crowns and hundredths The latter may be done in a day, and changed back to pounds in a day if it should not work well.

£5 note would be	20	crowns	crown	100	5 at 5/0	£1	5	0
Sovereign	„ 4	„	half	50	10 at 4/0	£2	0	0
Half ditto	„ 2	„	florin	40	12 at 4/6	£2	14	4
			shilling	20				
			sixpence	10				
			threepence	5		£5	19	0 × 4=23·80.

THE VARIOUS SCHEMES RECONSIDERED.

I. The Pound Mil (1,000) scheme.

This has the advantage—

1st. Of preserving the old term, pound.

2d. Of the capability of its being divided decimally with the present coins, with the assistance of some new coins.

It has the following disadvantages:—

1st. It changes the value of the penny in sums under the silver coin by adding 40 farthings to 960.

2d. It takes 1,000 instead of 100 as the exponent of the integer—a radical defect.

3d. If carried out in its integrity it will require four columns of money of account, while it is desirable, nearly imperative, that there should be but two. Should two be adopted the second would require three rows of figures, which would be inconvenient.

The above objections apply to it as a money of account.

As a money of payment it has amongst others the following disadvantages, viz.:—

Difficulty of computation, and of estimation and of payment. Ordinary persons could not compute the amount of articles in mils, nor would educated persons so readily as in shillings and pence. 6 dozen at 3*s.* 9*d.* is 1*l.* 2*s.* 6*d.* or 125, that would be the practice, not 6 at 187½, nor 6 at 1 87·5.

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It would be difficult to estimate mentally the value of the total when arrived at; for instance, what is the value of 187½, or of 1 8·75. It would take uneducated persons a long time to become familiar with it; and then how is 187½ to be paid? All these things are much more difficult to arrive at than in shillings and pence, even in whole numbers, and much more so when applied to halves and quarters.

A "bill of parcels," made out in mils, would be quite an elaborate matter, and would take a tolerable scholar in the first instance to accomplish. Then as to applying mils and florins, or mils alone, to lists of prices and to price books, the task would be terrific; and, when accomplished, perplexing, troublesome, and useless to any good end. It is hazarding nothing to say the people would never adopt the mil system, except for columns of account.

The most that the law can do, I imagine, is to say, that no sum shall be recoverable in a court of law, unless sued for in pounds, florins, and mils. The system might then be applied to final columns of account, all reckonings being made in shillings and pence. It would not for that purpose be a very bad money of account.

It would be worked something as follows:—

		s.	d.		£	s.	d.	
4 doz.	at	2	2	=	0	8	8	
13	„	3	4	=	2	3	4	
25	„	4	6	=	5	12	6	39 figures.
37	„	5	8	=	10	9	8	
					18	14	2	= 18,709 done mentally, but many sums would not be turned so readily mentally.

The main objections to it for the money of account are these:—There must be three rows of figures in the last column, and 1,000 must be the exponent of the integer instead of 100, therefore it would be an imperfect system. Amounts would not be computed as follows:—

4 doz.	at	108⅓	=	432
				1⅓
13	„	166⅔	=	1,660
				498
				4⅓
				4⅓
25	„	225	=	4,500
				1,125
37	„	283⅓	=	8,490
				1,981
				12⅓
				18,708⅓ 55 figures, rejecting all the fractions, which would not necessarily attach to the system, because sales would be made in even numbers.

How many £ s. and d. = 18 14 2, done mentally in this instance?

The result is, that the only good to be derived from the Pound and Mil System would be to apply it simply to accounts. The objections to that, that it would require three rows of figures in the mil column, and that 1,000 would be the exponent instead of the proper number, 100.

II. The half-penny or dollar and cent plan would work as follows, viz.:—

	s.	d.	£	s.	d.
4 doz.	2	2	0	8	8
13 „	3	4	2	3	4
25 „	4	6	5	12	6
37 „	5	8	10	9	8
			18	14	2
			20		
			374		
			12		
			4,490	=	$89·80 — 49 figures.

How many pounds ÷ 4,490 by 12 = 374·2 ÷ 24 = 18 14 2, 62 figures, reckoning those only marked under.

Few things would be reckoned in dollars and cents in the every-day transactions. Cotton, and land, and houses, and grain might be, but, generally speaking, reckonings would be made in shillings and pence.

The objections to this system as a money of account are: it is no multiple of the present silver coins of account. A new coin would have to be struck, or there would be none to represent this money of account. The pound would not be a multiple of the dollar, and therefore its value could not be easily estimated in it, nor vice versâ. Sums due in shillings and pence could not be readily paid in dollars; and there are 49 figures in the above calculation, 10 more than in the pound and mil plan.

4 doz.		26	=	104
13	„	40	=	520
25	„	54	=	1250
				100
37	„	68	=	2220
				296
				44·90 = $89·80, 43 figures.

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Here with these figures there are six figures less; but this decimal mode would seldom be resorted to, and in transactions generally, the figures would not conduce to brevity so well as these happen to do.

The American dollar is not $\frac{100}{120}$th of the English crown, but about $\frac{110}{120}$ths of it, or about 4*s.* 7*d.*, say 4*s.* 6*d.*, not 4*s.* 2*d.*

But there is the same value in about 4*s.* $1\frac{1}{5}$*d.* of English gold coin as in an American gold dollar. Therefore 100 represents neither the value of the American gold dollar, nor of the silver dollar; nor if either did exactly, would there be any benefit worth speaking of in such agreement.

III.—The Penny System.

This system would be practised in shillings and pence, and not in pence decimally, for the reason that shillings and pence are better understood,—and much readier calculated, even if no better understood.

Articles like cotton might be sold in pennies, and reckoned decimally; but for the most part reckonings would be in shillings and pence, thus :—

4 dozen	2*s.* 2*d.*	=	£0 8	8
13 „	3*s.* 4*d.*	=	2 3	4
25 „	4*s.* 6*d.*	=	5 12	6
37 „	5*s.* 8*d.*	=	10 9	8
			18 14	2
			20	
			374	
			12	
			4,490	45 figures.

How many pounds: 4,490 ÷ 12 = 3,742 ÷ 20 = £18 14*s.* 2*d.* 59 figures.

Decimally :—

4 dozen	26	=	104
13 „	40	=	524
25 „	54	=	1,250
			100
37 „	68	=	2,290
			296
			44,90 39 figures.

How many pounds: divide by 12 and 20, 3,742 = £18 14*s.* 2*d.* 48 figures.

The objections to it as a money of account are,—

No coin to represent the hundreds, but to find its value must be turned into pounds, shillings, and pence, or statings must be in pence. The English nation is not prepared to speak of pence.

Books might be kept in pennies, certainly; but to do so, and turn the amount into pounds, when to be dealt with, would be an imperfect and objectionable mode.

I think the Pound and Mil System quite as good for accounts as this; perhaps there is not much difference.

IV. The 10*d.* plan, making 10 penny pieces the money of account.

I think this plan impracticable, so long as weights and measures, and dozens and grosses, are not decimalized, and even then in ordinary transactions it would not be so convenient as the present system of shillings and pennies, because sums would not break up so well, nor divisions of money assimilate to divisions of articles so well.

V. The Victoria or 100 penny plan.

I think this a better plan than the penny plan, inasmuch as there would be a coin of account to represent 100, and amounts in books would always be stated in the coin in which they would be due; viz.—V. 44·90 :—

			£	*s.*	*d.*
4 doz.	2*s.* 2*d.*	=	0	8	8
13 „	3*s.* 4*d.*	=	2	3	4
25 „	4*s.* 6*d.*	=	5	12	6
37 „	5*s.* 8*d.*	=	10	9	8
			18	14	2
			20		
			374		
			12		
			44·90		49 figures.

How many pounds: 3,742 = 18 14 2 divided by 12 and 20. 58 figures.

Decimally :—

4 doz.	26	=	104
13 „	40	=	520
25 „	54	=	1250
			100
37 „	68	=	2220
			296
			V. 44·90 39 figures.

How many pounds: 3,742 = 18 14 2 48 figures.

The serious objection to this is, that sovereigns are not a multiple of it, and could not well be used along with Victorias, because it would be too troublesome to estimate the number of sovereigns requisite to pay an amount stated in Victorias.

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The same with bank notes. This objection applies to the 4*s.* 2*d.* dollar, the 8*s.* 4*d.* Victoria, to the ten penny plan, and to the penny plan. Another serious objection is this, viz., that neither the Victoria, nor the 4*s.* 2*d.* dollar, would be multiples of the present silver coins.

VI.—The Crown and Hundredth Plan. (Example No. 1.)

4 dozen	2*s.* 2*d.* =	£0	8	8
13 „	3*s.* 4*d.* =	2	3	4
25 „	4*s.* 6*d.* =	5	12	4
37 „	5*s.* 8*d.* =	10	9	8
		£18	14	2

How many crowns? £74·80 — 38 figures?
Reckoned mentally by multiplying by 4 = 72; add in 2 crowns in 14*s.* is 74, then 4*s.* 2*d.* at 20 cents to the shilling is 84 = 74·84. This could be reckoned with the greatest facility in books and accounts. It would not be required in ordinary transactions not on paper; those would be reckoned and paid in shillings and pence.

In 74·84 how many pounds—18*l.* 14*s.* 2*d.*—43 figures. Found thus: divide by 4 is 18—2 over is 10*s.*—84 cents 4*s.* 2*d.*, or 18*l.* 14*s.* 2*d.* Done instantaneously on paper; not required elsewhere.

Decimally 4 dozen	24 =		104
13 „	44 =		524
25 „	54 =	1,250	
		100	
37 „	68 =	2,220	
		296	
		4,490 pence.	43 figures

How many crowns? £74·84: Done mentally by dividing by 60 less 0; say 6 in 44·7; 6 in 29, 5 over; add 0 to 5 is 50 or 4*s.* 2*d.*—at 20 cents to the shilling; 74-84 done instantaneously.

8725 pence how many crowns? = 145.42; with a little practice done at a glance; but transactions would seldom be reckoned in pence, probably never but in shillings and pence, as example No. 1.

5 shillings, crown	=	100
2*s.* 6*d.*, half crown	=	50
2*s.*, florin	=	40
1*s.*, shilling	=	20
6*d.*, sixpence	=	10
3*d.*, threepence	=	5
$\frac{1}{100}$, hundredth or cent	=	1
Pound	=	4 crowns.
Half pound	=	2 crowns.
£5 note	=	20 crowns.

This plan has but one single disadvantage, viz., that the value of the hundredth is not the same as that of the penny. But this seeming disadvantage may turn out to be an advantage. I think it will.

It is settled conclusively in my mind, I have not the shadow of a lingering doubt on the subject,—1st, that decimal currency is not wanted for daily transactions; 2d, that with our present shillings and pennies, dozens, grosses, &c., and duodecimal system, no decimal money would ever, even in generations, be adopted by the people; 3d, that it would not be so convenient by far as the present system, even were all weights, measures, modes of computing by tens, &c. adopted; and therefore all that is wanted is a decimal money for accounts.

It being then determined that the decimal currency for accounts only is wanted, the question arises, what characteristics should this possess. I venture to say that it should have the following:—

1st. 100 should be the exponent of the unit of value, and there should be 100 steps from the highest to the lowest denomination, and only two denominations, viz., units and hundreds.

2d. There should be but two columns of money, that is, but two denominations as aforesaid, and the minor denomination column should have but two rows of figures.

3d. The pound sterling should be divisible by the unit of account, *i. e*, it should be a multiple of it, so that the eye at a glance would turn pounds into the money, or the money into pounds, say by halving or quartering it, or by some other simple mode of division or multiplication, because for a considerable period in estimating values people would turn the money into pounds, in the same way that learners of a language turn the new words into their own language in order to understand their meaning. "Bon jour" is not understood; the mind turns it into "good day," and then comprehends it. And also because the sovereign could not be conveniently used as a coin, unless it were a multiple of the money of account.

4th. It is important that sums arrived at in the shilling and penny calculations should be resolved into the decimal denomination by some simple divisor, so that the working may be mental; and also that the new denomination should also be turned into the old by similar easy means.

5th. The decimal plan should be adopted, if possible, without any change of coins, at least worth noticing. The coins should be capable of being applied either to decimal or duodecimal calculations; and it is especially important that the sovereign, if not the unit of account, should be a multiple of the unit of account, and also that bank notes should be so also.

6th. The name of the unit of account should be a monosyllable, sonorous, pleasant to the ear, exciting agreeable sensations and recollections, as "truths," and not "lies," "crowns" and not "fetters," &c.; and it should be, if possible, an English name, and not the name of the money of account of any other nation.

All these characteristics the crown plan has. None of the other plans have them to anything like the extent. The only defect it may be considered to have is, the non-uniformity of the cent or hundredth to the penny, and this by practice will probably be found an advantage.

S. A. Goddard, Esq.

The "crown" is in all respects a better name than "pound," and its value is sufficiently great to prevent an inconvenient quantity of figures, while its smaller value, as compared with the pound, will conduce to economy both in public and private expenses, and better enable the nation to come in competition with other nations,—a very important matter now that competition is increasing.

One great and decided advantage it has is this, that the system may be introduced at a moment's notice, without expense, and be abandoned as quickly, and at as little expense, should it not answer. It would simply be necessary to enact that no debts should be recoverable in a court of law, but in crowns and hundredths.

Gold crowns should be coined probably in flat rings.

After all, this question arises:—

Are the benefits to be derived by keeping accounts decimally sufficiently obvious to warrant the trial?

I think they are, provided the change does not involve much expense or trouble; and provided that, should it not answer, the present system could be reverted to, also with little expense and trouble.

These conditions appear to apply to the crown and hundredth plan completely.

To the pound and mil two column plan to a considerable extent.

To the penny plan to a rather less extent.

To the Victoria plan, the tenpenny plan, and the halfpenny plan still less.

I have had 20 years of experience in America and 40 years in England.

Edgbaston, Warwickshire,
May 20, 1857.

SAMUEL ASPINWALL GODDARD.

Communicated by Lord Overstone.)

Dr. J. E. Gray.

Dr. J. E. GRAY.

To The Right Hon. Lord Overstone.

My Lord,

British Museum, 7th August 1857.

I have not thought it necessary to send replies to the questions which you have been so kind as to transmit to me, inasmuch as I have given my opinions in regard to most of them in my evidence before the Commission, which is already printed. But I venture to offer some additional observations on a part of the question which appears to me not to have been yet sufficiently brought before the notice of the Commissioners, and which has, nevertheless, an important bearing on the question of a change in the coinage.

In the first place then it has been repeatedly stated by the advocates of change that a Decimal Coinage has been tried and found convenient in France, in the United States, and in other countries. In making this assertion it appears to me that these gentlemen confound two very distinct things, a Decimal System of Accounts and a Decimal System of Currency. Now, even were we to admit that the Decimal System has been found to answer very well as regards bills and bookkeeping, I think the evidence is incontrovertible that it has been a complete failure in regard to retail transactions over the counter; neither in France nor in the United States is the general retail trade carried on in accordance with a Decimal System, or by means of the Decimal coins of account established by the laws of the two countries, and this is a remarkable circumstance, and well worthy of being constantly borne in mind, when we consider that the Decimal Coinage of both countries has been in circulation for more than sixty years.

In France this is not only the case with reference to the small retail traders who deal in articles of universal consumption; but even in some of the Government offices the old methods of computation are adhered to, and the decimal scale ignored. Thus, if you inquire the postage of a letter not merely at the common receiving houses, but even at the great central post-office in Paris, the answer is given in sous, although the postage stamps are marked in centimes, and you are thus compelled to convert the sous into centimes, or vice versâ, in order to determine what are the right stamps to be affixed to make up the postage required. Other simple but comprehensive examples of the same fact are at this moment before me. According to the "Spectator" for the 25th of April 1857, "beef is now 21 sous the pound;" a late revolutionary placard posted in the streets demanded "pain à trois sous;" and in the number of "Galignani's Messenger" for the 31st of July 1857, the following are announced as the "Terms of advertisements, fifteen, twelve, or ten sous a line, according to the number of insertions; none under fifty sous." Judging by all that we know of the manner in which retail trade is conducted in France, it may safely be affirmed that decimalism or counting by tens has no greater hold on the minds of the people than it had before the great revolution. This is further proved by the fact that the double sou, which at the change of system was called a décime, in the hope that the people would be induced to count by it rather than by the sou, and thus convert their current money of account into a decimal coin, has never made the smallest way, the word décime being utterly unknown to retail trade, although many millions of a coin stamped with the name have been in circulation for half a century. So convinced have the Government at last become of the utter hopelessness of their endeavour to force this term, and with it the decimal idea, into general use, that the coin is now simply marked as a piece of "dix centimes." Thus all domestic calculations continue to be performed in sous on the vicesimal system, exactly as they were before the change in 1796, and not in décimes, which simple change would have been all that was necessary in France for the establishment of a decimal currency, but which successive governments, constitutional and absolute, have been unable to bring about. So wedded indeed were the people of France,—volatile as they are said to be, and mutable as they have shown themselves in other respects,—so wedded were they to the old system of currency, that many of the older coins were allowed to continue in circulation until the year 1834, forty years after the change; and even in 1856 it was necessary to issue an ordinance withdrawing them from use. In the meantime, instead of coining pieces of 20, 30, or 40 centimes, the Government were compelled to issue binary or quaternary divisions of the franc, that is to

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say, ¾, ½, and ¼ franc pieces, the latter coin being in one instance (an 12) stamped as a "quart." Indeed it is curious to observe how the names of these pieces have oscillated between ½ franc, ¼ franc, and 50, 25 centimes: by whatever name they were stamped, however, the people have persisted in calling them 10 and 5 sous pieces.* This continued and almost exclusive use of the sou in retail trade, and of the five-franc piece in larger commercial transactions, shews that the French made a great mistake in not regarding the sou or copper coin in common use as the basis of their Decimal system, as had been done by the Americans; reckoning 10 sous as their décime, and regarding the livre or franc as the fifth of a dollar, or whatever name they might have given to their five-franc piece.

The same observations apply to a considerable extent to Belgium, Sardinia, and Switzerland, which have all adopted the French monetary system, as may be seen by a reference to the official and other reports from those countries printed by the Commissioners. To give an idea of the impediments in the way of change, the impossibility of enforcing it against the habits and feelings of the people, and the trouble and confusion entailed on trade by the use of two concurrent systems, I beg leave to quote the following passages from Mr. T. Baring's communication on Belgium, which are quite consistent with my own experience in that country.

"In the country, large sums are generally mentioned in francs, small sums connected with the country people's daily dealings in Brabant guilders and stivers; and such is the force of habit with the Flemish peasants, that at this very day, in the district round Dunkirk, where the Flemish language still prevails, the farmers, though under French rule since King Lewis the Fourteenth, still speak of guilders and stivers, meaning by the same francs and sous of five centimes. In usual life, every man in Belgium is compelled to have constantly at hand his tables of reduction of the various monies, both past and present."—p. 272.

"Notwithstanding the legal introduction full sixty years ago of the decimal metrical system of weights and measures, the old local systems have not ceased to exist, though their existence is wholly illegal. In Antwerp and other important places the new systems have long been in work, especially for large transactions; but with the country people, as well as the lower orders in the towns, the old weights and measures are still the order of the day, and any other hardly spoken of. One must not, however, suppose that such weights and measures are tolerated by law; quite the reverse; the mere possession of old weights and measures constitutes in itself a misdemeanour, for which the law provides, and actually inflicts, fines and punishments. The people employ decimal weights or measures, and have recourse to numerous ridiculous and quaint calculations to transform the results into the old weights and measures, which vary almost from province to province, and to which they are so attached that it will be very difficult ever to eradicate the same completely. Small dealers do their best to keep up this state of things, as the confusion now subsisting prevents ignorant customers from calculating off-hand the prices at which the goods stand such dealers.

"Habit and routine are wonderful things; it would otherwise hardly be credited that up to this day, on the Antwerp Exchange, grain still sells in Brabant guilders, though by decimal weights and measures; and that the Antwerp sugar refiners sell their sugars by 100 pound old Antwerp weight, through a laborious reduction from the actual weight taken in kilogrammes from the scales."—p. 273.

In Sardinia, where the Decimal System was first introduced by the French in 1793, we are told by Her Majesty's Minister at Turin that the old and new systems continued in use concurrently for some years; but at present (1856), with the exception of the "Novarese," and to a certain extent Liguria, the new system is generally adopted. At Genoa (the commercial capital) the lower classes and retail dealers continue to use the old denominations; and in some instances the merchants' books are kept in double columns for the old and new money. "No inconvenience," he adds, "is felt at Genoa from the concurrent use, except by merchants who are still in some instances obliged to buy and sell in the old money, and subsequently, in their accounts, reduce it into new money." A simple inspection of the list of coins in circulation and of their values in lire and centesimi, is sufficient to prove how difficult must be this operation which "the lower classes and retail dealers" so wisely eschew. Switzerland, we are told, has "become part and parcel of France, so far as monetary transactions go;" and this absorption is quite natural, considering the relations between the two countries.

In the United States of America there exists the same attachment to the old system of currency, after the same lengthened period of trial of the decimal coins, as in France. Omnibus conductors, shopkeepers, and all those connected with the multifarious dealings of retail trade persist in the use of shillings and sixpences (so called), although there are comparatively very few coins answering to those denominations in circulation; and although the Federal Government has done its utmost, even within the last year, to recall those that still remain, and to recoin them in dollars and dimes. So universal is the custom of pricing by shillings, that a friend who has just returned from America informs me, that not only in country towns, but even in the larger cities such as Boston and New York, he was constantly obliged to request the shopkeepers to inform him what the price amounted to in cents, as he had to pay the "shillings" in that coin. In America, too, as in France, the smaller silver coins in common use do not represent 2, 3, or 4 tenths of the dollar unit, but in conformity with the concurrent custom of all mankind, to whom decimals are an unnatural mode of subdivision, the dollar is divided in a binary manner, into halves, quarters, and eighths. Thus they have a half dollar, a quarter dollar, an eighth of a dollar, a half dime, and a three-cent piece; and the reckoning of all the smaller and more ordinary retail transactions of trade is anything rather than decimal, either in reality or in its mode of expression. It is a striking proof of the inapplicability of the denary system to the affairs of common life that not one of the countries which have adopted a Decimal Coinage and Decimal weights and measures has adopted along with them the plan of putting up articles ordinarily sold in packets, such as gloves, stockings, &c., in tens, but all continue as before to put them up in dozens; nor do I know of any article in common use which is usually sold in tens. This is easily

* It is the same as regards measurement. In some of the more recent French Natural History works the measurements of animals are given in decimals of the metre, but this is generally accompanied by the equivalent in lines, and their aliquot parts, thus—0·0057m. (2½l.), or 0·0060m. (2¾l.), shewing the concurrent use of both systems, and the necessity for explaining the new by the old.

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understood when we consider that the quarter of a packet of ten, of stockings or gloves, would be two pairs and an odd one.

It follows that, instead of the habits of the people and the requirements of retail trade being in unison (as in this country under the existing system) with the system of coinage and accounts, there is (in those countries in which a Decimal System is enforced) one system for commercial transactions and accounts, and another for the retail transactions of every-day life. Such a complication cannot be regarded as a gain on the side of simplicity. At the present moment throughout the length and breadth of Britain there is one complete, uniform, and well-understood system both of coinage and accounts; but if a new Decimal System were to be introduced, it must (to judge from all experience) run concurrently with another system expressed in other terms, and better adapted to the purposes of retail trade; in other words, the new Decimal System and the old mixed system would be perpetually meeting, jostling, and confusing each other; and such a retention of the old system for common use, even setting aside the question of experience and utility, must appear perfectly natural to all who take an unprejudiced view of the subject. All those who have passed the age of childhood, and are versed in the use of the existing system, will naturally be loth to give it up, if they can in any way retain the expression of it. Their children and grandchildren will learn from them and from the shopkeepers with whom they deal, much more important lessons in relation to money transactions than they will be taught at school, and the old well-understood every-day system will keep its ground in spite of laws and ordinances to the contrary; such has been the case in other countries, and such would be the case in our own. The Decimal System having then failed entirely, after a lapse of more than half a century, in adapting itself to the retail trade of the two great nations by whose laws it is enforced, the natural repugnance of the mass of the people here to admit of any such change in the English system is easily accounted for and amply justified. It may safely be stated that the vast majority are opposed to any change, but they look with apathy on the agitation going on, under the firm conviction that no Government will sanction an alteration which must involve the whole retail trade of the country in great inconvenience and confusion, and prove such a fertile source of contention and annoyance, for no other reason than because it is believed that the change would facilitate the keeping of accounts, and save the trouble of dividing the column of pence by 12; for, after all, this is the only advantage that its most energetic supporters hold out to the world. We are told, it is true, that it would enable bankers, merchants, and certain public departments to conduct their business with fewer clerks, but even supposing that this would be the result (which I deny), can it be pretended that it affords a sufficient ground for placing the retail trade of the country in a state of confusion, from which that of France and America has not recovered after an experience of sixty years, and, as far as appearances indicate, is not likely ever to recover, although the change attempted in both these countries is slight indeed compared with that which it is proposed to initiate here? But this leads me to the second part of my subject.

In the second place, then, let it be particularly observed, that the changes attempted in France and in the United States, but which the retail trader still so firmly and pertinaciously resists, are not to be compared, in regard to their nature and extent, with the sweeping alterations in the entire system of the monies of account which the pound-and-mil decimalists propose to introduce here. In a country like England, where the system of coinage and accounts is fortunately in complete unison with the habits of the people, articles are sold, not so much with reference to the various coins in actual circulation, as with reference to those which are more especially the coins of account; every article is priced at present in pounds, shillings, pence, and farthings, as the case may be, and consequently an alteration in the names and values of the coins of account must of itself create confusion in the trade of the community. In France, prior to the change, the sou, and in America the halfpenny, were the ruling coins in the price of the articles of most universal use, and these were proposed to be changed in name only, without any alteration of their value. The new name proposed to be given to the sou has been uniformly rejected, while that of the halfpenny or cent has come into general use,* and is adopted as the coin of account. But in England it is proposed to abolish the penny (which is in like manner our ruling coin in the prices of articles of universal consumption) both in name and in fact, to remove its representative under an altered value (4 mils) from a place in the monies of account, and to remove it so completely from this position that no multiple by less than twenty-five shall hold such a place. The shilling, too, which, next to the penny, is the chief ruling coin, is in like manner to be shut out from the monies of account, and to be designated by a new name; thus, instead of pounds, shillings, pence, and farthings, we are to have pounds, florins, cents, and mils, according to the scheme of the Committee of the House of Commons; or pounds and mils only,

* To give an idea of the comparative simplicity of our present system of expressing the most ordinary transactions of trade, as compared with the Decimal systems of France, Holland, and the United States, and with the Decimal system proposed for our adoption, I submit the following table of approximate values in each:

English.	United States.	Dutch.	French.	Decimal proposed.
s. *d.*	*c.*	*c.*	*c.*	*m.* *m.*
½	1	2½	5	0·002· or 2
1	2	5	10	0·004· „ 4
2	4	10	20	0·008· „ 8
3	6	15	30	0·012· „ 12
4	8	20	40	0·016· „ 16
5	10	25	50	0·020· „ 20
6	12	30	60	0·025· „ 25
9	18	45	90	0·037· „ 37
10	20	50	100	0·041· „ 41
1 0	24	60	120	0·050· „ 50
1 6	36	90	180	0·075· „ 75
1 8	40	100	200	0·083· „ 83

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according to other advocates of the system; or mils only, according to Sir Charles Pasley. All prices, then, should this system be brought into operation, must be stated on an entirely new system, the most important denominations of which, (the two intermediate ones, namely,) would be widely different in value from those of the present. Such a sweeping alteration, I may boldly assert, would not and could not be adopted in the every-day transactions of retail trade; nearly all its dealings would be carried on under the old system, but with the additional complication of reducing its terms as nearly as possible to the new for the purpose of registration in bills and accounts.

I am aware that the advocates of the Pound and Mil Scheme state that they would retain in circulation the penny and the shilling, and all the existing coins except the half-crown and the four-penny piece; but in making this statement they carefully slur over the fact that the penny and shilling are no longer to be coins of account, that they are to pass by different names (the one having besides a different value), and that they must be entered in all accounts in a totally different manner. They may depend upon it, however, that so long as shillings and pence are permitted to exist, whatever may be the regulation of the law in relation to them, twelve pence will be reckoned by the great bulk of the people as equivalent to a shilling, and twenty shillings (and not ten florins) as the natural mode of subdivision of the pound.

There may be, and there of course will be, with the two systems in concurrent use, continued quarrels in relation to them, and much confusion and annoyance resulting from them; but these are penalties of the change which its enthusiastic advocates either refuse to anticipate or profess to regard as of trifling importance.

To return to the nature of the change attempted in France. Prior to the Revolution, commodities were sold by the livre and the sou, its twentieth part; subsequent to the Revolution, when (with the view of breaking down all old associations) the names of the most familiar things were changed, the livre (which had sometimes been called a franc) was ordered to be exclusively so called; it was almost imperceptibly altered in value, $\frac{1}{81}$, and, instead of being divided into 20 sous, it was divided into 10 double sous,—a coin already in common use, to which it was attempted to affix the name of décime. The décime was again directed to be divided into 10 centimes; but as the coins below a sou were very seldom called for, it may be said that there was scarcely any disturbance in or alteration of the coins in ordinary use, the franc, the double sou, and the sou. And yet at the end of sixty years the people have refused to adopt the slight change which consists only in substituting the double sou for the sou as their money of account, and persist in retaining the name of the latter, both as a coin and in their calculation of prices, notwithstanding all the ordinances and fines which have been fulminated against it.

Contrast the smallness of the change with the wide extent of that attempted to be perpetrated here, which proposes to abolish at once the use of three out of four monies of account, substituting for the two intermediate and practically the most important terms others with different names and of double or more than double their present values, and altering the lowest both in name and value. The introduction of the florin or two-shilling piece as a coin of account is in itself a change equal to that of the décime or two-sous piece in France, which, as we have seen, has entirely failed in that country. But, over and above this, we are to be favoured, as a money of account, with a cent in value $2\frac{2}{5}$ of our present penny, and bearing the most inconvenient relation possible both to present prices and to the habits of the people on which they are formed. For the last money of account we are to have a mil, a farthing depreciated 4 per cent. in value. But, inasmuch as ten of them are required before we reach the next higher term, the mil must of necessity be the most frequent denomination in all the ordinary transactions of retail trade, and cannot, for the same reason, be omitted (as the farthing now is) in the higher commercial accounts.

This complete change in the value of the monies of account on which the price of articles is to be marked must, if carried out, be productive of a corresponding and most puzzling change in the retail trade of the country. Thus, to take one of the simplest and most ordinary cases: instead of an article priced at 2*s.* 6*d.*, it must be marked, according to the system adopted, either £0·125, or 1 fl. 2 cents 5 mils, or 1 fl. 25 mils, or 125 mils, and so on on all other prices. But it may safely be asserted that this would rarely be attempted; the mass of the people would regard it in the light of a mystification; and, so long as the shillings and pence circulated, would buy and sell in shillings and pence as before, with the addition of a plentiful amount of grumbling and quarrelling over any discrepancy or supposed discrepancy between the new and the old, whenever either party thought fit to object to the other's mode of reckoning, or whenever it became necessary to record the result in the new system of accounts.

We will, however, suppose it possible that the new system should be adopted for the purpose of retail trade. Let us call to mind that every article of universal consumption, such as bread, meat, vegetables, sugar, coffee, beer, spirits, calico, flannel, coals, candles, soap, &c., is sold at so many pence per retail quantity, and that these articles are sold wholesale at so many shillings per ton, cwt., stone, gallon, &c., and we cannot but admit that it is scarcely possible to realize to one's self the vast amount of confusion, amounting almost to revolution, which such a change would produce in both the wholesale and retail trade of the country. And not in trade only, but in every relation of life would the change and its attendant confusion be felt, for it would equally affect the wages of the labourer, the pay of the soldier and the sailor, and the allowances commonly made to them. In fact, every transaction of life would be darkened by its shadow; in a multitude of cases, lowering with doubt and discontent.

Lastly, I beg leave to observe, that such a change would not only affect the manner in which prices are marked, and injure the poorer classes in particular by the substitution of coins of higher value for those in which their ordinary purchases are made, but must also have a direct effect on the prices themselves, and this for the two following reasons: in the first place, as it would be impossible, where the present price of an article or portion of an article is less than sixpence, to convert the price accurately into the new system,—as it must necessarily be always either a little more or a little less, in order to make it an entire number of mils,—the weaker, that is to say, the poor customer, would inevitably go to the wall. This likewise is proved by the experience of other countries. Those who are acquainted with the details of trade in the United States affirm that large profits are realized out of the small differences resulting from the

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decimal division of the coin, and the repeated binary division of the articles for which it is exchanged,—a fact which most emphatically contradicts the assumption of the advocates of a change, that all evil attending it would be corrected by competition. "The fractions resulting from reduction (of the money from non-decimal to decimal) are always," says Her Majesty's minister at Brussels, "detrimental to the poorer classes."

In the second place, the prices of a great number of articles are absolutely determined by the monies of account. Many articles are sold in England for a penny or a shilling as they are sold in France for a sou, 5 sous, or a franc, and in Holland for a cent or a florin. Now, if the monies of account be changed, there will naturally follow a change in the price of all these articles, and with a large increase in the value of the two most important denominations the change would certainly not be in favour of economy. On this branch of the subject I have formerly observed:—"It may appear extraordinary, but any person used to travelling in different countries where coins of account differ in value will very soon perceive that the common prices of a large number of articles are fixed by the amount of the current coins of account; as with us there are very many things sold for a shilling, so in France the same kind of articles are usually sold for a franc, while in Holland they fetch a guilder or florin, which is exactly two francs, and consequently things cost double as much as in France."

"The Committee paying no attention to this fact have recommended that the silver coin of account shall be a florin, equal to two shillings, and we have already had some experience of an inclination to increase the ordinary price of articles, such as one may expect were the proposed system to become common. Thus more than one advocate of the Decimal System of Coinage has published his lucubrations in a pamphlet, at 'a florin,' which would formerly have been issued at a shilling."

"But the effect of the change of the copper coinage will be still more serious, for there the increase in the money of account is from a penny to nearly twopence halfpenny; and even supposing that the article now charged a penny were hereafter to be sold for a half cent, there would be an increase of twenty per cent. in the price."

"In answer to this it has been said, that the half-cent loaf will be larger than the penny one, and so also will the penny cup of coffee; but if the penny one was large enough for the purpose of the purchaser, the increase in the size and quantity will be no gain to his want, while it will be a loss to his means."—p. 25.

These remarks were printed three years ago, and the more I consider the subject the more convinced I feel that the change in the value of the smaller monies of account, if it ever comes into operation, will entail a grievous loss on the mass, and especially on the poorer classes of the population, who purchase their ordinary article of consumption in small quantities, and are thus compelled to divide their daily, weekly, or monthly income into many small sums. The shilling or half florin being, under the operation of the Decimal System, divisible only into 10 portions ($\frac{1}{2}$ cents) instead of into 12 pence (or 24 halfpence) as at present, one-sixth part of their small incomes (in the great majority of instances) would be absolutely frittered away by the change.

Let me, in conclusion, add a few words as to the actual extent of decimalization as applied to coins. The three great Decimal Systems are those of France, Russia, and the United States; as far as regards the rest of the world, decimalization only exists in states of small account, or in those which may be regarded as off-shoots from one or other of these systems. We are frequently told of Decimal Europe, as though England were the only European country which had not adopted a Decimal System; whereas, on the contrary, the whole of central Europe constituting the great German commercial union is not only non-decimal, but has within the last few months deliberately refused the proposals of decimalists, and resolved upon a reconstruction of its monetary system on a basis better suited to the wants and habits of the people. "The Wiener Zeitung," says the "Times" of the 11th of June, contains the text of the Currency Treaty, Munz Vertag, which on the 24th of January 1857 was concluded between Austria, Prussia, Bavaria, Saxony, Hanover, Wurtemburg, and twenty-two of the smaller German States. In Northern Germany 30 dollars, in Austria 45 florins, and in Southern Germany 52$\frac{1}{2}$ dollars, will be minted out of 1lb. (of 500 French grammes) of fine silver. In order to facilitate commerce two silver "Union coins" will be minted, which will be current in all those German States that are parties to the treaty. The one coin, the dollar, will pass for 1 fl. 30 kr. in Austria, and for 1 fl. 45 kr. in Southern Germany; the other, the two-dollar piece, will be equal to 3 florins in Austria, and to 2 fl. 30 kr. in Southern Germany.

The metal of which the Union coins are to be made will consist of 900·000 parts of silver and 100·000 parts of copper, so that 27 single and 13$\frac{1}{2}$ double dollars will weigh one pound. On one side of the coin is to be the head of the Sovereign of the country, and on the other his arms, with an inscription stating how much fine silver the coin contains, and its value.

By the 31st of December 1862 all the contracting states must have minted £24, and during every successive four years £16, for each 100 persons of its population.

The Austrian zwanziger, a piece of 10 kr., will be entirely withdrawn, and, instead of these, coins worth a quarter of a florin, 5 groschen, or 15 kr., will come into circulation.

8,750,000 "Union dollars" must be minted and put in circulation in Austria by the 31st of December 1862. Even the Austrian coins of 6 and 3 kr. will have to be re-minted, as they must be exactly $\frac{1}{10}$ or $\frac{1}{20}$ part of the new Austrian florin, and consequently $\frac{1}{15}$ or $\frac{1}{30}$ part of the Union dollar.

For the convenience of the foreign mercantile world two Union coins in gold will be introduced. The one "the crown" will be the $\frac{1}{30}$, and the other "half-crown" will be the $\frac{1}{100}$ part of a pound (of 500 French grammes) of fine gold.

The metal of which the gold Union coins are to be made will consist of 900·000 parts of fine gold, and 100·000 parts of copper, so that 45 crowns and 90 half-crowns will weigh a pound. On one side of the coin will be the head of the Sovereign of the country; on the other, the name of the coin, in an open garland of oat leaves (corona), and the date.

The contracting states will mint no other gold coins, but Austria will be allowed to keep her ducats in circulation until the end of the year 1865. (This exception in favour of the ducat was absolutely necessary, as it is the gold coin which circulates in the East.)

As the gold "Union coins" will vary in value according to the price of gold at Vienna, Trieste, Milan, Berlin, Francfort, Augsburg, &c., they will to all intents and purposes be articles of commerce.

Dr. J. E. Gray.

All other German and foreign states are at liberty to become parties to the Currency Treaty, which is to be binding until the end of the year 1878.—"Times," 11th June 1857: Austrian Letter, dated 7th June 1857.

Such are the measures resolved upon by a sober and eminently practical people for the remedy of grievances in the variety, complexity, and confusion of their monies of circulation and account, which had become intolerable. For us, who have but one monetary system, complete in itself, sufficiently simple to be thoroughly understood by all, and admirably fitted to all its purposes, the lesson is plain:—Change could only lead us into those very evils of complexity and confusion from which others are endeavouring to escape, and into which it would be madness for us to plunge. I trust no Government will ever be induced to give encouragement to such a scheme.

I am, My Lord,
Your obedient Servant,
JOHN EDW. GRAY.

(*Communicated by Lord Overstone.*)

G. W. HEMMING, M.A.,

Late Fellow of St. John's College, Cambridge.

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Any one who was disposed to reply in a carping spirit to the questions which have been circulated might perhaps, without much difficulty, show that many of them have been framed so as to suggest answers more unfavourable to the decimal project than the facts fairly warrant. A considerable proportion of the examples introduced appeal quite as much to the habits which have grown up under the existing system as to the unbiassed judgment, and others seem to have been ingeniously selected so as to show an apparent advantage in the present coinage, where none in reality exists. Thus comparisons are suggested between divisions, multiplications, and additions, starting from 2*s.* 6*d.*, and the corresponding operations on 125 mils. The results are certainly favourable to the half-crown notation; but if the decimal notation where once established its advocates might with equal fairness ask which was the easier sum to deal with, 160 mils (or as it might still more concisely be written 16 cents) or 3*s.* 2½*d.*, and they would obtain an answer just as decisive in favour of their system. But without entering into such details I think it is fairer to look upon the entire series of queries, as the case made against the suggested innovation, resting partly I think on sophistical but mainly upon sound arguments. Some of the particular inferences suggested admit of explanation, but the case as a whole appears to me unanswerable; and I think it will be more useful to reply rather to the general question implied in the entire paper than to raise cavils about the pertinence of any particular illustrations. The broad question I understand to be, whether upon the whole the balance of convenience is on the side of our present arrangement of the coinage, or of some form of decimal progression; and though the case of the decimal scheme does not strike me as quite so bad as it would appear from the examples selected, I am decidedly of opinion that the evils of the projected change would preponderate over any possible advantage.

The first thing to be borne in mind is, that a change to a Decimal System would not be a transition from a defective to an ideally perfect system. If that were so the serious temporary inconveniences of the middle passage might be more cheerfully endured; but in adopting a decimal scheme we must be content to put up with permanent as well as transitionary evils in return for certain advantages which it would no doubt afford. The difficulty is to balance all the possible evils against the promised benefits, and I think it will be more easy to do this if, putting out of consideration for the moment all notions of what may be practicable in England in the year 1857, we examine what, abstractedly considered, would be an absolutely perfect system. For this purpose we cannot look at the coinage alone, but must take account of the relations which exist between our systems of coinage and mensuration, and our arithmetical notation itself. The principal requisites of a perfect system appear to be the following:

1. The coins, weights, and measures used for purposes of reckoning should advance from the lowest unit upwards by powers of the radix of notation. Intermediate multiples of the radix might also be used as subsidiary coins, &c., but not as coins, &c. of account.
2. The lowest unit of the coinage should be of convenient value.
3. Coins, &c. representing the half and the quarter of the lowest unit should be added.
4. The successive coins, &c. of account should neither be too numerous nor too widely separated in value. In other words, if the first condition is satisfied the radix of notation should neither be too small nor too large.
5. The coins, &c. of account, or what would be the same thing, the radix of notation, should be capable of exact subdivision into the greatest posible number of aliquot parts, and binary divisions should be especially favoured.

The reasons for these conditions are too obvious to need much explanation.

The first is the strong point of the decimalists, though half the benefit of it would be lost unless the whole system of mensuration as well as the coinage were brought into conformity with the rule.

The second rule is very essential. If the lowest coin in use for purposes of account is too small, our calculations are encumbered with needless figures. If it is too large, exactness is lost. The minimum ought to be the largest sum which can be safely neglected in ordinary accounts, a maxim which for commercial purposes is very well satisfied by the penny.

This suggests the importance of the third rule. The sum which a merchant may despise is important to a poor man; we ought, therefore, to have the means of graduating our minimum value. This is readily afforded by the use of the fractions ½ and ¼, while with a strictly decimal scheme there would be no medium between two minimum standards, one of which would be ten

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times sa large as the other. In fact, experience shows that the fringe of binary fractions at the lowest end of the scale is so convenient, that even the absence of the appropriate coins and measures will not entirely prevent its use. People will buy half yards and quarter yards, notwithstanding that three feet make a yard; and in America half cents and quarter cents are familiarly spoken of in preference to the corresponding value in mils. In this respect our halfpence and farthings satisfy a natural demand.

The fourth rule is important with reference even to ordinary arithmetic, and still more so with respect to the coinage. In no country, I believe, are there more than three steps in actual use in the coinage of account, and in general only two distinct names are employed. We have in England three denominations, *£ s.* and *d.*, and the inconvenience of a larger number will be seen at once by looking at a sum of money written down in pounds, crowns, halfcrowns, shillings, sixpences, pence, and farthings. Thus £5 19*s.* 10½*d.* would be £5. 3. 1. 2. 0. 4. 2. This inconvenience is not felt so much in a Decimal System, because it is always possible to group together as many successive figures as you please under one head. Thus, instead of 3 dollars, 7 dimes, and 4 cents, we may speak as they do in America of 3 dollars 74 cents; but this again introduces us to the opposite evil of too wide a separation of successive coins. The limits in this direction are easily fixed, but they are different for different people. A man who knew familiarly his addition and multiplication tables up to 50 + 50 and 50 times 50, and was provided with the necessary symbols, would work more easily and rapidly with a radix of 50 in his ordinary arithmetic, and a progression by fifties in his coins and measures, than he would do with any smaller number, because he would be dealing with a less number of figures in each particular case. The radix therefore cannot be too large, except with reference to the knowledge and habits of the person who has to use it. All persons who can reckon at all know their tables up to 12 times 12. Twelve, therefore, is not too large a number for the purpose. Twenty obviously is so at present, for it is a comparatively rare accomplishment to know the multiplication table up to 20 times 20. To take a simple example, most persons in reckoning the price of 9lbs. at 1*l.* 17*s.* 8*d.* per lb. would be five or six times as long in getting from the shillings to the pounds as in the easier transition from the pence to the shillings, because they know by rote the value of 9 times 8, while 9 times 17 is a result of calculation and not of memory. To obtain the greatest possible rapidity, even with our present coinage, the tables up to 20 × 20 ought to be got up; and if a radix of notation larger than 12 were in use it would be absolutely necessary to add materially to the length and complexity of the tables which would have to be drummed into the heads of the ordinary run of computers.

The fifth rule is the one of which the questions especially bring out the value, and which had previously been too little regarded. This is not confined to coins and measures. Even in simple arithmetic divisibilty of the radix is a very valuable quality. Thus it is much easier to divide any number, say 3494, by 5 or 25, than by 6 or 23, and the difference is especially felt if the calculation has to be performed without the assistance of paper. If tablets are used the processes in the first two cases would be as follows:—

$$\frac{3494}{5} = \frac{2\times(3494)}{10} = 698{\cdot}8$$

$$\frac{3494}{25} = \frac{4\times(3494)}{100} = 139{\cdot}76$$

Although they look longer, the following processes would, perhaps, be easier in mental arithmetic:—

$$\frac{3494}{5} = \left(\frac{3000}{5} \text{ or } 600\right) + \left(\frac{400}{5} \text{ or } 80\right) + \left(\frac{90}{5} \text{ or } 18\right) + \left(\frac{4}{5} \text{ or } {\cdot}8\right)$$

$$= 698{\cdot}8$$

$$\frac{3494}{25} = \left(\frac{3000}{25} \text{ or } 120\right) + \left(\frac{400}{25} \text{ or } 16\right) + \left(\frac{90}{25} \text{ or } 3{\cdot}6\right) + \left(\frac{4}{25} \text{ or } {\cdot}16\right)$$

$$= 139{\cdot}76$$

The corresponding divisions by 6 and 23 would have to be worked as follows, whether on paper or in the head.

$$\frac{3494}{6} = \frac{3000}{6} + \frac{480}{6} + \frac{12}{6} + \frac{3{\cdot}6}{6} + \frac{{\cdot}36}{6} +, \text{ \&c.}$$

$$= 582{\cdot}66 \text{ in inf.}$$

$$\frac{3494}{23} = \frac{2300}{23} + \frac{115}{23} + \frac{23}{23} + \frac{20{\cdot}7}{23} + \frac{{\cdot}23}{23} + \frac{{\cdot}069}{23} +, \text{ \&c.}$$

$$= 151{\cdot}913.....$$

omitting for facility all the decimals after the third place.

The great distinction between the last two examples and the former ones is, that in the latter you can only split up the total dividend into divisible quantities by a series of guesses which involve a number of tentative multiplications. In dividing by a factor of the radix or of a power of the radix, the dividend splits itself into divisible numbers without any effort, and when this is done the separate divisions can be effected by mere multiplication. The facility of dividing by a factor of the radix, or of some low power of the radix, is of immense value in mental reckoning, because the tentative mode of division interferes fatally with the retention in the memory of results previously obtained. This is an observation which will be found to bear very materially on another part of the subject which I shall presently discuss.

Division being so much more readily performed by numbers commensurate with the radix than by any others, it is obvious that that radix is, *cæteris paribus*, the best, which has the largest number of factors which commonly occur as divisors. The more of such divisors there are the easier will be the common operations of simple arithmetic. It is especially important that the radix should be readily divisible by the powers of two, because these occur more frequently than

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any other divisors. Two, four, eight, &c. are natural divisors. You can fold a piece of paper, or cut an orange into halves, quarters, eighths, and so on with ease; it is more difficult to divide it into thirds, and still more so into fifths. The same is true of all material divisions; and as these lie at the root of much of our practical arithmetic, it is easy to understand why the powers of two occur more frequently as divisors than any other numbers. All these considerations, which would influence the choice of a radix if we were constructing a new arithmetic, apply with equal force to determine the numbers by which the progression of coins and measures may be most conveniently regulated. In the case of coins and measures there is, besides, this further advantage in the use of a good divisible number, that it enables the most commonly recurring fractions of each coin, &c. to be represented exactly by one or more inferior coins, &c., and thus facilitates the process of retail payment or subdivision as well as the act of reckoning.

In the case of coins the special advantage of using readily divisible numbers for each progression is increased by the tendency of prices to accommodate themselves to the coinage. Such charges as 1*s.*, 1*s.* 6*d.*, 2*s.* 6*d.*, probably occur 100 times where 1*s.* 1*d.*, 1*s.* 5*d.*, 2*s.* 7*d.* occur once, and the convenience of the shilling being so easily split up into aliquot portions of pence is palpably felt in all such cases. The price of coffee ranges from 1*s.* to 3*s.*, but though 1*s.* 3*d.*, 1*s* 4*d.*, and 1*s.* 6*d.* are common enough, I never saw coffee advertised at 1*s.* 5*d.* or 1*s.* 7*d.* per lb. The advantage of divisibility is not, however, confined to the cases where prices are adjusted to the actual coinage; there is considerable facility in small reckonings due to the divisibility of the shilling, even where a price may be fixed without reference to the convenience of calculation or to the actual coinage. Thus, it is easier to divide 13*s.* 5*d.* or 17*s.* 2*d.* mentally by 2, 3, 4, or 6, than it would be if the same sums were expressed in mils, and for this reason, that the amount is already split up into two quantities, each of which is separately divisible. To take the first example, we know at once that—

$$\tfrac{1}{3}\,(13s.\ 5d.) = 4s. + 4d. + 1d.\ \tfrac{2}{3} = 4s.\ 5\tfrac{1}{2}d.$$

while $\frac{1}{3}$ (655 mils)= 218 $\frac{1}{3}$ or 218·33 is by no means so quickly arrived at. I have selected very simple examples, purposely to test the value of the two notations in the common transactions of common people; but it cannot be necessary to say much to show the great convenience of using easily divisible numbers for the progression of coins.

Now there is no number within any reasonable limits at all comparable in divisibility to 12. It has four divisors, which is more than any other number (except 18) has, until you reach the multiples of 12 itself. 18 is evidently inferior, because it substitutes a second 3 for the more convenient factor 2. The only other numbers which can for a moment be put in comparison with 12 are 8 and 16. They have more binary divisors, but independently of their less convenient magnitude the facility of binary division is not enough to compensate for the loss of so many factors as are found in 12, and its powers. As for 10 it is a wretchedly defective number. Look at the following list of divisors:—

Of 12—2, 3, 4, 6	Of 144—2, 3, 4, 6, 8, 9, 12, 16. 18, 24, 36, 48, 72.
8—2, 4.	64—2, 4, 8, 16.
16—2, 4, 8.	256—2, 4, 8, 16, 32, 64.
10—2, 5.	100—2, 4, 5, 10, 20, 25, 50.

Now observe the result of applying our five tests of a perfect system.

Rule I. This may be satisfied by any number.

Rule II. The penny fulfils this perfectly.

Rule III. Halfpence and farthings exactly conform to this.

Rule IV. Twelve is, with our present habits, neither too small nor too large.

Rule V. Twelve surpasses every other number in this respect, while ten is one of the worst.

It is obvious, therefore, that if we had *carte blanche* to create an entirely new system, we ought to employ 12 as the arithmetical radix and retain our present coinage unaltered up to shillings. To satisfy the first rule we should require to use instead of the sovereign a 12*s.* piece, say a noble, and at the same time to make such changes in our weights and measures as would make them strictly duodecimal.

The notion of compelling the use of the radix 12 by any arbitrary legislation, and thus supplanting the decimal by a duodecimal arithmetic, is no doubt quite visionary, though not, I believe, more so than the project of decimalizing all our coins, weights, and measures. One difficulty of a universal decimalization would consist in the violent change which would be required in all weights and measures in common use, which are almost purely binary or duodecimal. This change would be strenuously opposed, not only by the force of habit, but because it would deprive the people of the convenience afforded by the ready divisibility of almost all our measures of quantity, magnitude and weight, and would in fact, except in the one point of conformity with our existing system of numeration, be a decided change for the worse. The difficulty would not be nearly so great in the transition to a duodecimal system. A second objection to a complete compulsory change, which applies to decimals and duodecimals alike, would be, that a vast accumulation of results in the shape of scientific tables, &c., compiled at the cost of enormous labour, would be rendered useless until translations had been effected into the new notation. Although it is so long since the decimal scheme was nominally adopted in France, they have not yet, I believe, converted all their scientific tables, and for all practical purposes angles are still measured by degrees, minutes, and seconds, for want of tables expressed in the decimal notation of grades. This difficulty would be felt even more severely in any attempt to force the universal use of duodecimal arithmetic. Not only the natural and logarithmic tables of sines, &c. would require translation, but even the logarithms of numbers would have to be recalculated to a new base and expressed in a new scale of notation. A third hindrance to a compulsory duodecimal scheme would be the necessity involved of acquiring new modes of calculation, but this which at first sight looks the most formidable of all. would be found comparatively easy to surmount.

But though it is plainly hopeless to attempt to enforce a strictly uniform system, whether decimal or duodecimal, it is well worth considering whether such changes might not be introduced as would facilitate the voluntary use of duodecimals by those who should learn to appreciate their immense value. Granting that the only perfect system is unattainable as an exclusive method of calculation, we ought not to abandon it altogether in favour of any inferior scheme until

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we have inquired how far it would be practicable to put it within the reach of any one who chose to adopt it, without interfering with the use of the existing modes of calculation by other persons. This will not be found nearly so arduous an undertaking as may be imagined. The idea of founding a new arithmetic certainly appears at first sight sufficiently startling, but bearing in mind that it is suggested only as a voluntary system the difficulties, though not inconsiderable, will, I think, on examination of the details, be found far less formidable than those which would have to be overcome in introducing the pound and mil notation. To decimalize the coinage on this basis, even without approaching the wilder project of introducing decimals into every branch of mensuration, would require a very harsh interference with the daily habits of the whole population. You cannot change the value of the smaller coins without breaking up habits, interfering with contracts, disturbing all fixed tolls and rates, and doing a vast amount of injustice. To take a case of which many instances might be specified, a railway may make an income of some 250,000*l.* out of tolls limited by statute to such sums as $\frac{1}{4}d.$, $\frac{1}{2}d.$, $\frac{5}{8}d.$, 1*d.*, 2*d.*, and so on per ton. If the pound and mil system were introduced the income would be depreciated 4 per cent., or 10,000*l.*; in other words, the balance which provides the dividend would be entirely swept away. Such instances might easily be multiplied. Toll bridges, turnpike trusts, &c. will occur to every one, and there are, besides, many other payments which are fixed at 1*d.* by custom almost as rigidly as if they were regulated by law. If the penny were depreciated it would be found impossible to raise the price to any other existing coin, and the loss of the whole or a large proportion of the profits would ensue.

I have referred to these points to show the sort of inconveniences which the innovators are prepared to face. Compared with them the difficulty of introducing duodecimals as a concurrent system with our existing arithmetic would be quite insignificant. The only alteration required in the coinage would be the addition of a 12*s.* piece with a new name, which might be a noble. The pound might still be retained until people grew tired of using it, as they would do very soon, when they found how much more easily they could work with the new coin. The transition indeed might be greatly fostered by issuing first bank notes of 5 and 10 nobles, which would be equivalent to 3 and 6 sovereigns, and as the pound fell out of use replacing them by the more appropriate 6 and 12 noble notes. In carrying out this scheme not a single contract would be affected, and the present facility of making retail payments would still be retained, together with our smaller coins. Even to harmonise the entire system of weights and measures, which is practically an impossibility on any decimal principle, would be perfectly feasible. Add a measure of 4 yards or 2 fathoms, and the linear table is duodecimalized at once. Thus 12 inches = 1 ft., 12 feet = 1 stade, or whatever the new term might be, would be all we should require. The fathom and yard would still be useful as supplying the fractional fringe at the lowest end of the scale in dealing with large quantities, in which it would not be desirable to descend to feet and inches. It would not be very necessary to extend the notation up to a mile, because miles and yards are seldom if ever combined, except indeed, in the authorized tables of cab fares; but if this pedantic accuracy were desired, what would be easier than to change the length of a mile from 1760 to 1728 (12^3) yards?

Then, again, in weights we should only have to use the troy standard for all purposes, and introduce one new weight equal to the $\frac{1}{12}$th of an ounce. The quarter of this would bring us to 10 grains, so that there would be no violent collision either with the maximum or minimum of the present scale. The troy scale might also be extended upwards by a weight of 144lbs. instead of the cwt. (829,440 grs. instead of 784,000 grs.), and another of twelve times that amount. It might be convenient to retain the old ton for some purposes, on account of its having been used in fixing tolls and in other legislative enactments.

In dry measures of bulk the gallon might be the lowest unit, and the quart and pint would be represented by the fractions $\frac{1}{4}$ and $\frac{1}{8}$. In proceeding upwards we should want a new measure of 6 pecks (12 gallons) in place of the bushel. When the immense variety of higher measures now in use in different places is considered, it is obvious that the employment of a six-peck measure, with another of 72 pecks instead of the quarter (32 pecks), would not even at first add much to the complexity already existing, while its superior convenience would sooner or later put to the rout all the quarters, sacks, loads, lasts, bolts, and the three or four different barrels and other measures which now perplex every one who desires to compare the prices of different localities.

In liquid measure the quart would perhaps be the best minimum unit, and we should only have to add one new measure of 3 gallons (12 quarts), the next step in the scale being the 36-gallon cask, which is now commonly used. Pints and gills would be represented by the binary fractions of the quart unit.

Finally, in time we have already 12 hours each for the conventional day and night, and the construction of our clock faces seems to ask for a specific name for five minutes or one-twelfth of an hour. This would duodecimalise time for all ordinary purposes. For astronomical calculations it might be impossible to make a change without deranging the records of past observations. For such purposes the old division into minutes and seconds might still have to be retained in preference to any other.

Add to this that the habit of packing things by the dozen and gross would fall in with duodecimal calculation, and it will be seen that without any change which would be felt as an inconvenience for more than a very short time, our whole metrical system might, for all practical purposes, be made strictly duodecimal. To obtain such uniformity would be quite out of the question if decimals were taken as the basis, and the change of the coinage alone into the pound and mil shape, while it would fail to secure the advantages of perfect conformity to the radix would be felt as a far heavier grievance than the complete modification of weights, measures, coins and all, on a duodecimal footing.

When the slight changes I have mentioned were introduced the schoolmaster would do the rest, and would do it very easily. Consider how little any one would have to learn who desired to avail himself of the great advantages of duodecimal computation. In the first place he must have two new symbols for ten and eleven. A 6 reversed thus ↄ would do very well for ten, being suggested by its resemblance to the letter *d*, and its analogy to the figures now in use. A reversed 9 (ɐ) which is suggested by the letter *e*, would serve equally well for eleven. It would not take long to become familiar with these symbols.

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The next step would be to frame a method of counting. This, indeed, is not necessary for paper calculations, but it is always a great assistance to the mind to have a name for the symbols used. Thus persons who work with duodecimals in calculating areas and cubes, in feet, and inches, find it convenient to call the successive numbers pence and shillings, in order to make the readier use of their knowledge of the pence table. If the system were more generally employed a less clumsy nomenclature would be desirable. Thus we might count up to a dozen by the present names. From 13 to 24 we could say a dozen and one, a dozen and two, and so on, but a more compendious method is suggested by the way in which sums of shillings and pence are sometimes spoken of. Fifteen pence is often shortly called one and three, half-a-crown two and six, and so on. This mode of speaking would serve admirably for duodecimal numeration. Thus the numbers from twenty-five to thirty-six would be termed two and one, two and two, two and three, &c., which would be quite as good as the twenty-two, twenty-three, &c. of our present arithmetic. It may be thought that by this phraseology some confusion would arise, as for example, between the term "three-and-six" meaning three dozen and six, and the same term when used to signify "three + six." But the following example of an addition sum in shillings and pence shows that the apprehension is groundless :—

s.	*d.*
1	9
1	6
0	3
3	6

This might be read, *three and six* are nine, and nine are eighteen,—six and carry one and one are two and one are three,—*three and six*, where the ambiguity occurs without producing any real confusion. The multiples of twelve ought also to have short names ; for such terms as two dozen, three dozen, &c. would not equal in neatness our twenties and thirties. Perhaps they might be abbreviated into twosen, threesen, &c., or twoen, threen, &c., which are brief though not quite harmonious. However, the point to be observed is that no new name (except such abbreviations as these) would be required in reckoning up to the third place or "gross," which would take up the same position as the hundred of decimal arithmetic. By adopting the term "gross" we should have all that is necessary up to 12^4. A name for a gross of gross, say a lac, would carry us up to 12^8, or more than 400,000,000, and we might then go on as far as we pleased with bacs, tracs, &c., which would not be more barbarous than billions, trillions, and quadrillions. But for all practical purposes the one additional name for which lac or any other term might be used would be the only new term required to make duodecimals run glibly off the tongue up to amounts far larger than are wanted even for such formidable accounts as the national balance sheet. So far, therefore, we have encountered no difficulty. The next and last condition to enable us to use the radix 12 is that the addition and multiplication tables must be known in the scale of twelve up to twelve times twelve. In point of fact, everyone knows them already, and it would only be necessary to combine in the mind the common multiplication table with the common pence table, and to write down the shillings and pence, without any dots between them. Thus, take multiplications by 10.

		d.	*s.*	*d.*
10 × 1	= 10	10	= 0	10
10 × 2	= 20	20	= 1	8
&c.	&c.			
10 × 11	= 110	110	= 9	2
10 × 12	= 120	120	= 10	0

The practice of a few days would enable any schoolboy to write and think these tables off at once into the scale of twelve. Thus,—

		Read thus—
∂ × 1	= ∂	Ten times one equals ten.
∂ × 2	= 18	Ten times two equals one and eight.
&c.		&c. &c.
∂ × ℰ	= 92	Ten times eleven equals nine and two.
∂ × 10	= ∂0	Ten times twelve equals ten dozen (tensen).

I have picked out an example which contains the greatest possible number of novelties, and it looks startling to the eye at first, but a very little reflection will, I think, convince any one that the effort of acquiring the necessary habits would be extremely small ; as it would only have to be made by volunteers it would be no serious obstacle at all, and when the process had become familiar it would be much easier to work even simple arithmetic in the scale of twelve than of ten, on account of the greater divisibility of the radix. The easy changes in, or rather additions to, the coins, measures, &c., which I have already suggested would also completely do away with compound arithmetic, which is the great object of the decimalists, though they can only partially attain it, on account of the implacable hostility between the number ten and the natural method of dividing material quantities.

It being thus easy to acquire the art of working readily in the perfect scale of 12, it remains only to consider the drawbacks inseparable from the concurrent use of two scales of notation. In the first place it may be supposed that some confusion would be apt to occur between the two, and that numbers written down in one scale would be occasionally read by mistake as if they belonged to the other. I think, however, this danger would be very small. Where calculations extended to any length the new symbols for ten and eleven would be sure to occur whenever the scale of 12 was used, and prevent the possibility of error. Besides, so far as regards the use of duodecimals merely as a private mode of calculation, and not as means of communication, there would be little fear of a man mistaking the arithmetical language employed in his own books. Even when made the medium of communication the risk of blunders of this kind would be very small. Some idea of its extent may be formed from the experience of foreign merchants, who are compelled to make use of various different coinages in their accounts. Did any one ever hear of frequent errors arising from mistaking francs for shillings, or dollars for pounds ? In France at

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this day a double language does exist in many particulars. Thus the decimal and the sexagesimal divisions of the circle are both in use, and sous are still familiarly spoken of at the same time that the amounts are written down in the decimal notation. The apprehension of confusion from the employment of two forms of arithmetic may therefore, I think, be laid aside as groundless.

There is only one other possible objection to the use of duodecimals, viz., that a man who kept his accounts in this form would be unable to communicate the results to an adherent of the old-fashioned decimal mode without going through the labour of reducing them from one notation to the other. This would be so far an inconvenience. Let us consider its amount in order to see whether it outweighs the other advantages of the system. Take the most unfavourable case, that of a man using duodecimals in his own books while all the rest of the world adhered to decimals. Whenever he wished to communicate arithmetically with any other person he would have to go through the process of reduction. Would this involve more labour than he could save in his own calculations? I think not. If he had any long reckonings to go through there can be no doubt that the economy of labour throughout the process would much more than compensate for the trouble of reduction. There would perhaps be a certain class of reckonings of a simple kind and involving large amounts in which the balance might be the other way, but on the average of accounts I think there would be found a very decided gain from the use of duodecimals. To find the area of a rectangle whose sides are given in feet and inches is a very simple problem, involving only a single multiplication, yet even in this where the number of feet is not very large, many persons think it worth while to reduce the quantities to duodecimals, perform the multiplication, and then reduce the result back to the scale of 10. In more intricate problems involving feet and inches this process is unquestionably the easiest, and the greater the complexity of the problem the more would be saved by the use of duodecimals. The fact is that the reduction from one scale to the other is a very short and easy process. Thus, to pass from the scale of 10 to that of 12, if the number is not greater than 144 requires no calculation, but merely the application of the common pence table Thus, 112 (decimal) = 94 (duodecimal), may be written down at once, and would cost absolutely no effort when the pence table had been got up in the shape of a duodecimal table, without being encumbered with the idea of shillings and pence. If the number to be reduced were not greater than 12^3 or 1728, one division by 12 would be the whole difficulty. Up to 12^4 (more than 20,000) two divisions only would be needed, while four divisions would effect the transformation for all numbers up to 12^6, or nearly three millions. The converse operation, to pass from duodecimals to decimals, would require in the same way one division by 10 for numbers up to 1440, two divisions up to 14,400, and four divisions up to 1,440,000. Even these processes might be greatly shortened by tables giving the value of 1,000, 2,000, and so on in the scale of 12, and corresponding tables for 12^3, 2×12^3, &c., which would, without much difficulty, be acquired by rote.

There would, therefore, I think, be a decided gain even to a person who was a solitary duodecimalist in a decimal community, supposing, of course, that the coins, weights, and measures were accommodated to him; but when the convenience of the method was once recognised, whole classes might be expected to go over to the new practice, and the occasions, when the trouble of translating results would have to be gone through, would be limited to those when a duodecimalist had to interchange ideas with a pure decimalist. If any effort were made to convince the mercantile world of the benefit to be derived from the process, and to train up accountants familiar with it, it would not, perhaps, be very long before a duodecimal phraseology might become the current language of merchants, and all or almost all the inconvenience of a double system would thus be obviated. Poor people, shopkeepers, and others out of the regular commercial pale, would be longer in acquiring the new habit; but even if decimals continued to be the retail language, this would interfere very little with the use of the more convenient method in mercantile accounts. A merchant might write twelve dozen 100 in his counting house, and 144 in ordering candles at his tallow-chandler's without much risk of confusion. The two languages would soon settle down to their own territories, and clash no more than Welsh and English do in the general affairs of the country. We have many instances of the same kind of thing even in the actual arithmetic of the markets. A dozen in some trades means 12, and in others 14; a hundred of walnuts is 120, and different localities attach different values to the same weights and measures. Tons of 2,640lbs. and 2,688lbs. may be found in use in the same district in addition to the standard ton of 2,240lbs. A barrel means 14, 16, or 20 stone, according to the nature of the grain sold, and multitudes of similar anomalies exist without producing the confusion which might *à priori* be expected to ensue. It would be the same with duodecimal arithmetic if it obtained a partial or class circulation; but there is no reason why it should not in course of time become almost universal, decimals being retained in those departments of science and business which are dependent on tables recorded in that shape. Translation into decimals might also be necessary in communicating with foreigners, and would be attended with inconveniences of the same order, and no more, as are involved in the translation in similar cases of English into French, and the like. But if the schools were set to work judiciously, a few years would produce a rising generation of all grades in society quite competent to work with duodecimals. A little influence exercised by school inspectors would go a great way, and a due regard to proficiency in the subject in the examinations for pupil teachers and Queen's scholars would do still more. In a short time, if only a few merchants could see their own interest in the matter, a duodecimal clerk would be worth much more in the market than a gentleman whose arithmetic was confined to the scale of 10. The demand would create the supply. Commercial schoolmasters would make a great point of the subject, and the whole country would, after the first few lagging steps, be trained with great rapidity to the new and easy learning.

One other consideration seems to me of great importance. I have already put the case of a solitary duodecimalist working in the midst of a world conformed to the scale of 10. Suppose even a worse result, viz., that after the coinage &c. had been accommodated to the project, old habits proved too powerful, and no one could be brought to use the radix 12,—suppose, in short, the scheme were tried, and in its grand object completely failed, even then there would be a residuum of good, because, irrespective of their adaptability to a better arithmetic, the new coins, measures, &c. would be intrinsically better than the old. If you hold by the radix ten, it would yet be easier to work with 12*s.* to the noble than with 20*s.* to the pound, and so with other measures

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of quantity, &c. An experiment in which success would be an immense gain, and failure itself an improvement of some kind, may be very safely tried.

These considerations seem to show that the practicability of encouraging duodecimal arithmetic is at least deserving of careful consideration, and that the difficulties are in fact less than any decimal scheme, especially the pound and mil plan, would have to encounter. If the project should be thought too bold an innovation, it is clear that any other must be only a compromise between the requisites which I have mentioned as essential to a perfect scheme. But even supposing that a duodecimal system is not to be thought of, would it be wise to sacrifice the use of the duodenary division of the shilling for the very inferior progression by tens, in order to secure the advantage of conformity between our coinage and our arithmetical notation? The fault it must be remembered is all on the side of the latter, and is entirely due to the unlucky circumstance that men have ten fingers and not twelve. If the Philistine giant who had six fingers on each hand and six toes on each foot had been the inventor of a system of numeration, he would assuredly have proceeded by steps of 12 instead of 10, and we should have escaped the difficulties which now beset the question; but the habit of using decimals having become universal and perhaps ineradicable, is it worth while to accommodate our coinage to it? There are, I think, ample reasons to show, that if we cannot establish the best system of all, we are better as we are than we should be with the decimalized coinage.

If we cannot mend our arithmetic we are not obliged to spoil our coinage. That such would be the consequence of introducing a decimal notation follows I think from the considerations I am about to refer to. Coins are used in three ways: 1st, as a means of making payments; 2d, as instruments of mental calculation; 3dly, for the purpose of paper computations. It is not necessary to answer minutely the questions intended to show that purchases of fractional parts of a pound or a yard would involve more trouble and admit of less exactness in payment if the shilling or florin were divided into tenths instead of twelfths. This is the necessary result of employing a number whose factors are only 2 and 5 in place of one, divisible by 2, 3, 4, and 6, and I think it would be useless to dwell upon the point more fully than I have already done. So far as retail transactions are concerned, it will probably be admitted on all hands that a Decimal Coinage would be a change for the worse. It is equally true, though less obvious, that in mental calculation we should gain little or nothing by the change, even if we did not actually lose facility by it. All methods of calculation consist of splitting up the problem to be solved into a number of simpler computations, and then combining the results. A scale of notation is serviceable in two ways. First, it enables us to reduce any process to a number of additions, multiplications, &c., either by digits less than the radix, or by the radix or some power of it. The former are set down from memory, the latter by mere inspection. The other aid which it affords is by enabling us without any effort so to record our partial results under their heads of tens, hundreds, and the like, that they may range themselves in the positions best adapted for grouping them into a complete total; whereas in compound arithmetic, where the advantage of the regular scale is to some extent lost, we can only split an aggregate number of pence into shillings, and shillings into pounds, by an actual process of division by 12 or 20. Of these two advantages derived from a scale of notation the latter is entirely, and the former to some extent, sacrificed in mental reckoning. The great difficulty when no tablets are used is in the recording process, and not in the minor calculations. When the intermediate steps of an arithmetical problem are set down on paper, it matters not how many are accumulated before they are combined into a single total; but the mind cannot work one subsidiary calculation, and at the same time retain any considerable number of partial results already arrived at. The mental computer must group his subsidiary calculations together step by step as he goes on, and in recording them in his memory he thinks of hundreds, thousands, and so on as names much in the same way as he thinks of pounds and shillings, without being either helped or hindered in this part of the process by the fact that these values may be indicated by the position assigned to the digit. I believe that Mr. Bidder, the famous calculator, learned to reckon before he knew how to use a scale of notation at all, and thus escaped the common mistake of attempting to perform arithmetical operations in the mind in the same way in which they are most readily performed on paper. The cardinal rule is to begin at what the paper calculator would call the wrong end, *i. e.*, with the highest denominations instead of the lowest unit, and the process is almost equally easy whether the problem is one of simple or compound arithmetic.

Examine the process with reference to the primary rules of arithmetic. In adding a long list of figures on paper compound addition is a little more troublesome than simple, because you have every now and then to divide some large aggregate of pence or shillings by 12 or 20 instead of by 10, as in the other case, but the difference disappears in mental reckoning. Instead of taking all the pence or all the units first, the addition of the first amount to the second is completed before the third is approached, and the occasion for divisions by 12 or 20 never occurs at all, or at least only with numbers less than 24 or 40 respectively. Now to take 12 out of 15 or 18 is as easy as to take 10 out of the same number, or in other words, compound is by the mental process as easy as simple addition.

In multiplication by large numbers some benefit is derived even in mental arithmetic from having a scale of notation, but the comparison we have to institute does not much concern large numbers. It is only in the two or three last decimal places that any difference would be made by decimalizing coins. The multiplication of the pounds goes on decimally as it is, and the test of the two methods will, therefore, be to compare operations on amounts in which the pounds are limited to a single digit. Nor ought we in an experimental example to employ very large multipliers, because it is only in comparatively simple cases that the mental process is attempted. Now let any one perform the following operations:

	£	s.	d.		
14	× 2	2	3	and	14 × 223
9	× 3	18	6	and	9 × 3186
215	× 2	7	9	and	215 × 279

and I think he will find that although the figures are the same, the former class may be calculated mentally just as rapidly as the latter.

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The one process would be,—

£	s.	d.		£		
14	× 2	2	3	= 28	+ 14	(2s. 3d.)
				= 29	+ 8s.	+ 14 (3d.)
				= 29	+ 8s.	+ (3s. 6d.)
				= 29l.	11s.	6d.

The other would be,—

14 × (223)	= 2800	+ 14	(23)
	= 2800	+ 280	+ 14 (3)
	= 3080	+ 42	
	= 3122		

At any rate, even in such multiplications, without the help of paper, there is no appreciable advantage derived from the use of a scale of notation. An irregular progression (if the steps are easy in themselves, as by 12 and 20) is about as easy to deal with as one by powers of 10.

In division the advantage conferred by a scale of notation is even less, and where the radix is not a very easily divisible number there is more than a counterbalancing inconvenience. The ordinary divisions which a man has to do in his head are in fact easier in compound than in simple arithmetic, not because the regularity of the progression by 10 is not some benefit in itself, but because 12 and 20 are more divisible than 10. I have already in discussing the last of my five fundamental rules referred to the circumstance that the tentative process, which is so troublesome in division, may be got rid of whenever the divisor is a factor of 10, and then the shortest mode of proceeding mentally is to divide first the highest denominations by themselves, then the next, and so on, each division resolving itself into mere multiplication. Precisely the same thing may be done with pounds and shillings, and as the divisors of 12 and 20 occur more frequently than those of 10, mental division is, in the majority of cases, easier in compound than in simple arithmetic.

Upon the whole, it may at least fairly be said that nothing would be gained in mental computation by decimalizing the coinage. The one solitary advantage would therefore be, that it would facilitate computations on paper. There is no doubt that with the aid of tablets the addition, multiplication, &c. of numbers expressed in any continuous scale of notation is a more expeditious process than when they are stated in pounds, shillings, and pence, but it should not be forgotten that, without any interference with the coinage, the use of decimals is quite possible in commercial accounts. The only obstacle is the labour of reducing every sum to decimals of a pound, or to pence, or to some other single denomination, before setting it down in the day book or ledger. The saving of this amount of trouble is all that the advocates of decimal coinage propose to effect by a change which would be useless for the purposes of mental calculation, and injurious so far as the convenience of retail transactions is concerned. It is worth while, therefore, to consider what would be the extent of the trouble of using decimals in accounts while the present coinage was retained for other purposes. This would, after the habit was once acquired, be much less than is commonly supposed. Take any sums, say 125*l.* 18*s.* 7*d.*, or 257*l.* 19*s.* 3*d.* If these were reduced to decimals of a pound by the orthodox practice according to Cocker, the pence would have to be divided by twelve, added to the shillings, then divided by twenty, and added to the pounds. This, of course, would be an intolerably long proceeding to go through before entering an item in a book of accounts. But a much simpler process would be adopted. In the first place, the pounds, and the even shillings or florins, can be converted into decimals by inspection, without anything that can be called calculation at all. Thus,—

£	s.	d.		£		
125	18	7	=	125·9	+	7*d.*
257	19	3	=	257·9	+	1*s.* 3*d.*

The conversion of the 7*d.* and the 1*s.* 3*d.*, if done by calculation, would take a little time; but it would be no great addition to the educational labours of a clerk to get up by rote the value, in decimals of a pound (or mils) of all sums from 1*d.* up to 2*s.* What difficulty would there be in learning off the following short table?

d.		m.
1	=	4
2	=	8
3	=	12
4	=	17
5	=	21
6	=	25
7	=	29
8	=	33
9	=	37
10	=	42
11	=	46
1*s.* 0*d.* = 12	=	50

s.	d.		d.		m.
1	1	=	13	=	54
1	2	=	14	=	58
1	3	=	15	=	62
1	4	=	16	=	67
1	5	=	17	=	71
1	6	=	18	=	75
1	7	=	19	=	79
1	8	=	20	=	83
1	9	=	21	=	87
1	10	=	22	=	92
1	11	=	23	=	96
2	0	=	24	=	100

But after having mastered this very simple business, the conversion of £ *s. d.* into mils, or £ decimals, would be effected by writing at the end of the value of pounds and florins the equivalent for the remaining portion of the sum to be reduced, as furnished by the above table. Thus in the examples which we have already taken,—

£	s.	d.		£
125	18	7	=	125·929
257	19	3	=	257·962

would be written down as fast as the pen could form the figures; and all the advantages of decimal computation would be gained without any appreciable sacrifice of time, or any addition to the labours of accountants, beyond the preliminary task of getting up once for all a short and easy table. If it were desired to be accurate as far as farthings, it would only be necessary to add one to the number of mils for each farthing in the sum to be reduced.

When all the proposed benefits of the decimal coinage can be thus easily secured by the commercial classes without interfering with the coinage at all, it does seem unfair to embarrass retail dealings with dimes, cents, and mils, merely for the sake of relieving schoolboys and accountants from the trouble of making themselves familiar with a table, the length of which is but one sixth of the common multiplication table—which tradition, it is true, has branded as "vexation," but which most boys know well enough before they are ten years old. Even the slight trouble of reducing moneys to their value in mils would, after a time, be saved in the majority of transac-

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tions, because, when once the decimal mode of keeping accounts became general, wholesale prices would commonly be stated in this form, while the *l. s. d.* notation might be retained in our shops and retail markets.

As between the existing coinage and the best of the decimal schemes, I am strongly of opinion that the evil of the change would preponderate over the good; and if any experiment is to be tried at all it appears to be worth considering whether the duodecimal method, considered as a voluntary system is so entirely extravagant as at first sight it appears, and whether it might not be developed without much difficulty and without any risk. At least there seem strong grounds for saying that the project would not be more formidable, while it would be much more complete, than the pound and mil scheme.

It may make the views which I have urged more intelligible if I sum them up in a series of questions which seem to invite a full investigation.

1. Whether the conditions of a perfect system of numeration account and mensuration are not,—
   1st, a duodecimal radix of notation;
   2d, a coinage unaltered up to shillings, and having a twelve-shilling coin instead of the sovereign;
   3d, a duodecimal system of weights and measures, with a fringe of binary fractions below the smallest unit.
2. Whether it is not equally impracticable to extirpate decimal arithmetic in favour of duodecimals as a compulsory and universal method, and to decimalize our entire system of coins, weights, and measures, and whether, even if the latter were done, the result would not be very inferior to a duodecimal scheme, mainly on account of the small divisibility of the number 10.
3. Whether the only choice does not lie between these three courses,—
   1st, to make such changes as would enable those who chose to do so to make use of a perfect duodecimal system;
   2d, to decimalise the coinage alone;
   3d, to retain the present system unaltered.
4. Whether the modification of our coins, measures, &c., which would render duodecimal calculation possible as a voluntary system, would not have these facts in its favour,—
   1st, that the method if adopted would be perfect.
   2d, that it would disturb no existing arrangements and contracts;
   3d, that it would not affect retail transactions;
   4th, that (even if it should turn out that no one availed himself of the facility afforded by a duodecimal radix) it would be productive of some permanent advantages and no permanent evils.
5. Whether the temporary inconveniences of such a transition would not be very slight as compared with those which would result from the pound and mil scheme. [N.B. The principal steps would be to coin a twelve-shilling noble, to extend troy weight, and to establish a four-yard measure, a six-peck measure, a three-gallon measure, and a five-minute measure, in addition to those at present in use.]
6. Whether the task of acquiring the art of duodecimal reckoning would not be a very trifling addition to the present arithmetical labours of school boys. [N.B. Two new symbols for ten and eleven, and a new name for 12^4, would be the only necessary innovations.]
7. Whether, even if duodecimals were only adopted for calculation, and never used as a medium of communication at all, the saving of labour in complicated reckonings, and perhaps in all except the very simplest, would not much more than compensate the trouble of converting the results into decimals when it became necessary to communicate them.
8. Whether, if the duodecimal method were adopted pretty generally among certain classes, it would not also be used for communication among them, so as to save even the trouble of reduction to decimals, except when communication became necessary between a member of the duodecimal classes and a member of the decimal classes.
9. Whether it is not a very possible result that the great advantages of duodecimals would lead to their general adoption by the commercial classes, while decimal language might survive in the retail shops until a generation grew up who had been trained at school in the new arithmetic.
10. Whether this training might not easily be promoted by the agency of Government School Inspectors, and through the examinations of pupil teachers and for Queen's Scholarships.
11. Whether the use of two concurrent notations for different purposes would be likely to lead to any greater difficulties than the use of different coinages by foreign merchants does now.
12. Whether the permanent effects of decimalizing the coinage alone would not be the following,—
    1st, to impede retail transactions;
    2d, to increase rather than diminish the difficulties of ordinary mental calculations;
    3d, to facilitate paper computations by partially getting rid of compound arithmetic.
13. Whether it is not at least doubtful whether the permanent evils of any decimal system would not exceed the permanent advantages.
14. Whether the pound and mil scheme in particular would not be attended by another permanent evil, namely, the inconvenient minimum value, and the want of the gradations supplied by binary fractions of the unit.
15. Whether in this respect the penny or ten-penny scheme would not be far preferable.
16. Whether the pound and mil scheme, or any scheme which changed the minimum coin, would not work violent temporary evils, and whether, in this respect also, the penny or ten-penny is not less objectionable.
17. Whether the penny or ten-penny scheme would not lead to an inconvenient maximum coin (*8s. 4d.*), too large for silver and too small for gold.
18. Whether all the advantages promised by decimalization might not be gained without any of the corresponding disadvantages, and without any change in the coinage, at the cost of a very little labour on the part of accountants in acquiring the art of reducing money to decimals by inspection and memory.

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19. Whether (especially for the last reason) it would not be better to leave the coinage unaltered than to introduce any Decimal System.
20. Whether, if any decimalization were determined on, the penny or ten-penny scheme would not, on the whole, be better than the pound and mil scheme.
21. Whether the encouragement of the voluntary use of duodecimals does not promise greater advantages and involve less risk and inconvenience than any of the modes of decimalization that have been suggested.

G. W. HEMMING.

Lincoln's Inn, 12 June 1857.

(*Communicated by Lord Monteagle.*)

Sir J. F. W. HERSCHEL, Bart.

(N.B.—I beg leave to correct a very glaring mis-print in the printed record of my Evidence before the Committee of the House of Commons of 1853, which has caused mis-apprehension. See question 543, page 50, line 7 from the bottom, for 270,000,000, read 470,000,000.)—J. F. W. H.

QUESTIONS

Sir J. F. W. Herschel, Bart.

Drawn up with the view of bringing under distinct Notice and Examination some of the Advantages of our present System of Coinage, and some of the principal Objections and Difficulties which have been suggested with respect to the proposed introduction of the Decimal Principle.

They are to be understood as intended to promote a thorough and effectual investigation of the validity or invalidity of the arguments submitted by the opponents of the proposed change; and they are not to be taken as intimating any conclusive opinion on the points referred to.

> "The best opportunity is thus (by written memoranda) afforded for a mature consideration
> "of statements made and of arguments adduced in support of (or in opposition to)
> "measures proposed for consideration, and the most effectual precaution taken against
> "misconstruction and hasty inconsiderate decision."—*Peel Memoirs*, vol. ii. p. 99.

I.

1. Do you think any change in our present system of Coins desirable?

Answer. I do.

2. On what grounds does your objection to our present system of Coins rest?

Answer. On the grounds—(*a*) That it is inconvenient; (*b*) circuitous; (*c*) needlessly complex; (*d*) productive of arithmetical difficulty, and thereby affording openings for error; (*e*) a cause of the loss of much valuable time in the practical business of life; (*f*) a clog on educational progress, and, as such, a grievance and an injury to the community; (*g*) obstructive of clear and synoptic views in all financial and statistical discussions where money prices are concerned.

(*a*) *Inconvenient.*—From the necessity of the special statement of £ *s. d.*, and either quarters or fractional forms of entry for farthings where any single sum is mentioned, as well as from the awkward and troublesome columns it requires in account keeping.

(*b*) *Circuitous.*—Because it requires a much greater number of figures (besides letters, dots, and other marks) to be written in account keeping, and in the statement of sums of money generally, than a better system, such as the decimal, would do.

Demonstration:—Write down every possible amount from 1 farthing up to 1*l.*, both included, on the present system; thus $\frac{1}{4}d.$ $\frac{1}{2}d.$ $\frac{3}{4}d.$ 1*d.* $1\frac{1}{4}d.$—1*s.* 1*s.* $0\frac{1}{4}d.$—19*s.* $11\frac{3}{4}d.$, £1, (omitting zeros, where even shillings and even pence occur) on the present system, and you will have written 3,952 figures. Do the same on the decimal system to express every possible sum from 1 mil to £1, both inclusive (not omitting terminal zeros when even tens or hundreds occur) thus, 1*m.* 2*m.*—9*m.*, 10*m.*—100*m.*—999*m.*—1,000*m.*, and you will have written 2,893 figures. If the letters, dots, and fractional lines be taken account of, the disproportion is very much greater in favour of the decimal system.

Again, if the account be kept, or the sums written, only to the nearest penny in the present system, and the nearest 5 mils on the decimal, the former will require for all the possible sums 609 figures—the latter 581. This supposes the decimal account to be stated in mils throughout, retaining the terminal zeros, but if kept in cents, and the intermediate half-cents written with a decimal ·5, thus 0·5, 1, 1·5, 2—99—99·5, 100, only 483 figures would be required.*

(*c*) *Needlessly complex.*—The existing system is vicenary in its first subdivisions, duodenary in its second, and binary in its third. A division of the pound into 30*s.*, and of the shilling into 30 minims ($2\times3\times5$) would have given 900 subdivisions, have preserved abundance of perfect aliquots, and have had the advantage of uniformity; but the present mixed system is neither consistent in its several members, nor in accordance with that system of numeration by which all nations express number. The decimal system is uniform, and in such accordance.

* The view taken by Mr. Minasi in his Evidence (Report of 1857, question 737), in which he comes to an opposite conclusion on this point, making the number of figures on the mil system 692 in the case proposed, is, I submit, not correct. He actually reduces every sum as stated in pennies to its nearest equivalent in mils, and then sums the figures in the mil statement, i.e., he accepts an abbreviated form of statement on the one side, and rejects it on the other. Now to make a fair comparison between the two systems, it is indispensable to consider each as established, and as if the other had no existence. Suppose the Decimal system established, there can be no doubt that bankers would coun only to the nearest half-cent. Whether the bankers' accounts were kept to the nearest penny or to the nearest 5 mils (or 5 farthings as coins now run), would make absolutely no difference on a long account, or at least one so utterly inappretiable that it would be absurd to take it into consideration as a reason for rejecting this simplification.

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(*d*) *Productive of arithmetical difficulty, &c.*—It is needless to enlarge on so plain a position. The appeal is to every book of arithmetic, where examples are given in "compound addition, subtraction, multiplication, or division," in "Reduction," "Practice," "Interest." To find what fraction one sum is of another, *i.e.*, what is the ratio of two proposed sums of money (when both contain odd shillings, pence, and farthings) is really a formidable operation, whereas, being a case of very common occurrence, it ought to be one of the simplest and easiest, as it is in the decimal system. In adding up long columns of figures the change of unit in carrying from column to column is an endless source of blunders.

(*e*) *A cause of the loss of much valuable time in the practical business of life.*—On this point the evidence printed in the Report of the Committee of 1853 must be considered as conclusive. Vide that of Messrs. Hankey, Question 26, 27, 28; Pasley, Question 203; Airy, 277; De Morgan, Question 709, 822, 760; Miller, 1243–1246; Bennoch, 1253, 1254, 1272; Beard, Question 1293, &c.

(*f*) *A clog on educational progress, &c.*—It surely cannot be necessary in this stage of the decimal question to go over this ground again; only I must say that I am surprised that Professor De Morgan, an advocate of the decimal system, should have hesitated about rating at the higher per-centage than he has done the amount of the mischief and the extent of the nuisance which it is proposed to put an end to, in this respect, by its adoption. (See Report, 1853, Question 709.)

(*g*) *Obstructive of clear views in commercial, financial, and statistical discussions.*—A few questions will illustrate the sort of obstructions complained of—

(α) What per cent. is an income tax of 7*d.* in the pound?
(β) Who sees, when it is first proposed to him to pay 16*d.* in the pound that this means one-fifteenth part of his income?
(γ) What is the difference to the revenue whether a duty is $7\frac{3}{4}d.$ or $9\frac{1}{2}d.$ in the pound on 50,000 cwt.?
(δ) On a population of 29 millions what is 1*s.* $5\frac{1}{4}d.$ per head?
(ϵ) What per cent is 8*s.* $7\frac{1}{2}d.$ on 134*l.* 14*s.* $3\frac{1}{4}d.$?
(ζ) What annual rate of interest is $6\frac{3}{4}d.$ per cent. for 11 days?
(η) What is the rate per cent. of interest on an Exchequer Bill at $2\frac{3}{4}d.$ per diem?

Who does not feel that in the innumerable such cases that occur in the sort of subjects above mentioned, the system of £ *s. d.* is obstructive, draws off the attention unduly from the subject to the figures, and exhausts it in needless detail of calculation? In all such inquiries the use of logarithms is an immense facility, but to prepare sums for their use a tedious and harassing preliminary reduction to pence and farthings is almost always necessary.

3. (1.) Do you consider them as defective or inconvenient for any of the purposes of retail transactions, *i.e.*, for paying or receiving?

Answer. They are not, in my opinion, inconvenient in small retail transactions. Few systems are so when people are used to them. In Holland, in 1822, I found that to change a guelder into the smallest number of pieces it was necessary to add 2 stuyvers to it, and get in change four "six-stuyver pieces" (valued at $5\frac{1}{2}$ stuyvers each). I found in circulation pieces of $1\frac{1}{2}$ guelders (30 stuyvers), of 28 stuyvers, of 52 stuyvers, and in changing a Napoleon it was not unusual to get all these coins and a parcel of two-stuyver pieces and copper doits and pfennings (8 for a penny) besides. Yet retail was practicable; nobody but myself seemed to complain, and I never heard that the Dutch found any difficulty in buying or selling over the counter, or at market.

(2.) Or is your objection restricted to the inconvenience of our present Coinage for the purposes of Account keeping and Calculation?

My objection is not altogether so limited. I think the £ *s. d.* system both of coins and of reckoning less intelligible, more perplexing, as compared with the decimal. I consider that there are many persons who would be able to cast up a shop bill, and know whether they were cheated, if decimally stated, which would confuse them in £ *s. d.* This, it may be said, is "calculation." It is so, but it is one which has to be made in every payment; and to a foreigner, accustomed only to a decimal coinage, the change of scale mixes itself as a source of annoyance and confusion with every payment in which gold, silver, and copper coins pass mixed together from hand to hand. The calculation is inseparable from the currency. On the other hand, the transition to a decimal currency on going abroad is felt as a relief. I met with this passage the other day in the "Englishwoman in America," (London, 1856):—"At Hamilton I was exceedingly puzzled with the Canadian currency. The "States money is very convenient. I soon understood dollars, cents, and dimes, but in the "Colonies I never knew what my money was worth." (i. 197). And again: "So simple is the "coinage of the United States that in two days I understood it as well as my own. Five "dollars make an English sovereign, and 100 cents are a dollar, and with this very moderate "amount of knowledge one can conduct one's pecuniary affairs all over the Union. The simplicity of the calculation was a great relief to me after the relative values of the English "coinage in the Colonies." (i. 86.) I merely cite these passages to show how the process of "calculation" mixes itself with every act of payment.

4. (1.) What do you consider to be the primary purpose of coins?

Answer. To do away with barter, by affording a numerable, ponderable, verifiable, and graduated scale of relative value, and so to serve as a basis on which the abstract notion of money value and that of a general medium of exchange can be raised.

(2.) Do you consider them as fractional subdivisions of the integer created for the purpose of adjusting retail payments?

(2.) I consider fractional subdivisions of some integer or unit of coinage as the only possible mode of cash payment (other than by weight) when the amount is not expressed in integers. Whether wholesale or retail is no matter, odd sums over integers occurring as well in the one as the other. Provided the unit be sufficiently subdivided to meet minute values, and the members of a coinage be reasonably varied, and the smaller coins sufficiently abundant, and in fit proportions, I consider all the essential conditions of retail as well as wholesale payment satisfied. I make no distinction.

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(3.) Or do you consider their primary character to be that of instruments the purpose of which is to facilitate Accounts and Calculation?

(3.) I consider coins (meaning the particular monetary members of which a coinage consists) as of absolutely no use in facilitating accounts and calculations, though they may add to their difficulty. Nobody who has a bill of 17*s.* 9*d.* handed to him thinks of the sum as seven half-crowns and a threepenny piece; though if he happen to have those coins in his purse, he will very likely pay it so. When a price is named to you for an article, you do not judge it cheap or dear by considering how many threepennies, or sixpennies, or seven-shilling pieces it will cost. You think only of the money of account, totally disregarding the coins in which it will come to be paid for. It is the business of the money of account to facilitate accounts and calculation; that of the coins, to afford a simple and convenient medium for their material application and liquidation in all cases which may arise. There is much money of account which has no coin to represent its unit, as the mark banco.

No doubt, however, a coinage, the elements of which should be discordant with the money of account, would be a nuisance. Such would be a Decimal Coinage with our present reckoning of *£ s. d.*

5. If one of the purposes must to some extent be sacrificed or made subordinate to the other, which do you think is entitled to the priority in our estimation?

Answer. The primary use of coins, as explained in answer to Question 4 (1.), is of paramount importance, and cannot be made subordinate to any consideration; but this being secured, I consider that with a well-chosen series of coins, a sufficient range of subdivisions, and a plentiful supply of small coins, there is so little difference in the convenience of any one in comparison with any other (when once worked into practice), that it is not worth being put in competition with distinct and eminent advantages of other kinds, should such be found on either side.

6. (1.) Is not the Coinage chiefly concerned in the process of buying and selling by retail?

(2.) And must not the question of the merit or demerit of any system of Coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments?

(3.) Are you aware of any complaint against our present system of Coins in this respect?

Answer (1.) No doubt more money passes in retail than in wholesale transactions.

(2.) No. (See answer to Question 5.) Provided, of course, the "unfitness" for making small payments be not one of so gross and glaring a kind as need not be contemplated in this discussion.

(3.) No. Except that there are not farthings enough in circulation. I mean not so many as it is desirable there should be, in order that retail prices should follow more exactly than they do the variations of wholesale. In Ireland, the use of the farthing (at least three or four years ago) was unknown, except in the immediate neighbourhood of Dublin, Cork, or Belfast.

(4.) Is not *the use of the Coinage*, that is, the fitness of the Coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small payments which arise, the consideration of primary importance, rather than the improvement of a system of Account keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

(4.) The "use of the coinage" is, no doubt, of primary importance in the choice of a coinage. Any system of coinage must be a bad one which compromises its use. But if twenty different systems of coinage be all very good and useful for a certain purpose, and one of them pre-eminently so for a certain other purpose, and that a very important one, in which all the rest miserably fail, assuredly we ought to prefer that one. Now that is the real state of the case as between the Decimal System and the present one, and all others. The Decimal has this immense advantage over the other; and as respects mere convenience in payment, it is fully on a par with any yet devised, besides possessing some other distinct advantages, to be mentioned in their proper places.

Affluent and educated classes versus poor and uneducated ones.—The advocates of the Decimal System may, I think, justly protest against any enlisting of popular feeling on this score. For my own part, I believe the change would equally benefit all classes, with one very trifling exception, and that in favour of the latter. The subdivision of the pound into 1000 parts instead of 960, and the fact that this minuter subdivision would be kept constantly and systematically in view, while in the present system the farthings are thrust out of sight by habitual disuse, and almost out of knowledge, must have a tendency to make the retail market follow more closely the fluctuations of the wholesale. The retail dealers (I mean no disparagement, and I do not speak of great towns, where there is plenty of competition to keep them in check) take very good care to obstruct its doing so as far as they possibly can, and will always do this, adopt what system we may.

7. Do you recommend the introduction of the *Decimal* principle into our Coinage?

Answer. I do.

8. (1.) Is it not impossible under the Decimal system to break the Integer into as many clear fractional parts as we now obtain under our present system of Coins?

(2.) Do you not consider that this is an objection to the Decimal System?

Answer. (1.) Meaning by fractions aliquot parts, yes; but I consider this as a point of very trifling importance, when brought into competition with the great advantages of the Decimal System in other respects.

(2.) I consider a division by 3 to be in some cases comparatively speaking to the disadvantage of the Decimal System, though of little moment. People speak much of halves and quarters, but little of thirds. But when on the subject of divisibility, I would contrast the two systems in another manner. (*a*) Tell me off-hand, can 4*l.* 8*s.* 5$\frac{1}{4}$*d.* be equally divided among 3, or among 9, or among 11 persons in coins of the realm? (*b*) Take the same figures 4851 in mils? The answer requires only inspection of the figures.

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As to breaking the integer into exact aliquot parts, the advantage has been unduly exaggerated. People, when they talk of 3*d.* as the price of anything, look on it rather in comparison with 2*d.* or 2½*d.*, or 3½*d.* or 4*d.*, than as the 80th of a pound. They look on 6*d.* oftener as half a shilling, than as the 40th of a pound; but its legal name of "half-shilling" has been driven out of use by "a sixpence," the idea of fraction succumbing to that of multiple. But in point of fact, people quite as well understand what 7*d.* or 8*d.* means as 6*d.* or 4*d.*; and as to individual pieces, they look on each of them as on a definite object *sui generis*, with which they are familiar, and deal with them as such, withoutmuch caring what fractions they are of the pound. Their primary idea of a halfcrown is not, that 8 of them go to the sovereign, but that it will change into two shillings and one sixpence.

9. (1.) In an old but very remarkable treatise on Coin and Coinage (Vaughan, 1675) this passage occurs:—

"Of all the numbers, Twelve is the most "proper for Money, being the most "clear from fractions and confusion of "Account, which ought not to be neglected, by reason that of all other "numbers it is most divisible, being "divisible into units as all numbers "are; into two parts as no odd number "is; into three parts as no even number is but six, and the numbers that "consist of sixes; into fourths, into "which six is not divisible; and into "sixths."

Answer. (1.) Vaughan is rather a fanciful writer, but he is so far right in the abstract, that 12 would be in some respects (not in all) a preferable number for numerical reckoning to 10. If we had a duodecimal arithmetic, a Decimal Coinage would be a nuisance; but we have a decimal arithmetic, and we have not a duodecimal coinage.

(2.) In the Memoir dictated by Napoleon at St. Helena, on the new French system is this passage:—

"On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux "facteurs 2 et 5, et que 12 en a quatre, "savoir, 2, 3, 4, et 6. Il est vrai que "la numération décimale, généralisée "et exclusivement adaptée au mètre "comme unité, donne des facilités aux "astronomes et aux calculateurs; mais "ces avantages sont loin de compenser "l'inconvénient de rendre la pensée "plus difficile. Le premier caractère "de toute méthode doit être d'aider la "conception et l'imagination, faciliter "la mémoire, et donner plus de puissance à la pensée."

(2.) Napoleon was a great warrior, and his opinion on a matter of strategy is authority. He was a bad statesman, a bad financier, a bad political economist, and a very bad judge of commercial matters. In such, then, his opinion goes for no more than that of any other person capable of being so characterized.

(3.) What validity is there in these considerations as objections to the introduction of a Decimal system of Coinage?

(4.) Or in what does the fallacy of them consist?

(3.) "What validity, &c." In my opinion these considerations have no validity as objections against introducing a Decimal coinage.

(4.) Fallacy is too strong a word. They have a *scintilla juris* about them. If I must call them fallacious I should say that their fallacy consists in putting out of sight the fact of their utter inapplicability to the present British system, which is not duodecimal but mixed. 2ndly, in attributing a much overrated importance to the point of aliquot subdivisibility. As I do not wish to meet opinion by a simple contrary opinion, I will observe on Napoleon's dictum, 1st, that it admits the advantage the Decimal system gives to calculators. 2nd, that nothing which renders thought difficult *can* be any advantage to them. 3rd, that so far from rendering thought difficult, it simplifies and renders it easier. The man who, when a number is proposed to him, has to think whether it admits of being broken up into pairs, or threes, or fours, or sixes, has an element of distraction in his mind to draw off his attention from the subject-matter, which he who depends on a straightforward method, and throws over short cuts and cases of *ease*, is free from. 3dly, the first requisite of a "method" and that which constitutes it a "method" is, that it be generally and equally applicable without distinction of cases. I have quite as clear a conception of 11 by considering it 10 and 1, as by regarding it as 3 times 3 and 2, or as two fours and a three. 4thly, in the Decimal system (as compared with the £ *s. d.* system of currency) the advantage on the side of memory is all in favour of the former. There is no need to get by heart a "pence table," nor the long string of "Practice" aliquots, which sadly puzzle many a boy both to conceive and to recollect—still more to apply.

10. Must there not be an inferiority as regards fractional divisibility in any Decimal system of coins, as compared with a coinage founded on a combination of the Binary with the Duodecimal scale?

Answer. No. In the scale of coinage as it has been proposed to make it, there will be less aliquot divisibility, and this I have shewn in my evidence (Report, 1853) Qu. 529, to be rather an advantage as far as facilitating some payments is concerned. As regards the system as one of account, I reply, In the scale of numbers 1, 2, 3.....1000 there occur more numbers fractionally divisible into aliquot parts than in the scale 1, 2, 3.....960. There is a greater probability of finding a sum proposed at random in mils to be equally divisible among a determinate number of persons (proposed also at random) than a sum expressed in £ *s. d.*, the division being made in each case in the corresponding currency: for the decimal sum value for value, is *ipso facto* divisible into a greater number of sub-units, and the proportion of primes is less in a greater number than in a less.

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11. Is there not great force and truth in the remark of Napoleon, that a Decimal system of dividing the Integer and of expressing the fractional parts, must be less favourable to distinctness of conception, to facility of recollection, and to readiness and ease in mental calculation, than a Binary, or than our present system?

Answer. Of all the systems of numeration and subdivision, the purely Binary is intelligible to the lowest grade of intellect. But it is not possible to use it as the system of numeration, by reason of the cumbrousness of its expression. When we get above 3 or 4, numbers are considered quite as well *per se*, or as having a certain place and order in a systematic scale as in the light of multiples and parts—indeed, more so. 5 or 7 is quite as clear a conception as 6 or 8. The number 10101 is far more readily conceived by its decimal numeration than by considering it as consisting of 3367 threes.

Napoleon's dictum cited above is inapplicable to our present system, which is not Binary nor duodenary, but a mixed system of both with a vicenary, and is anything but favourable to clearness of conception on this very account. Perhaps this is the right place (since a great name has been called in) to say a few words on the superior "clearness of conception," "facility of recollection," and "readiness of mental calculation," which is claimed for the £ *s. d.* system of reckoning over the Decimal. I deny it altogether. For, be it observed, it is a system of reckoning, *i. e.* of numeration, as facilitated by combining units into certain groups, and these again considered as units into certain other groups, and these again into groups of a higher order, and so on, with its appropriate rules for their addition, subtraction, multiplication, and division. Now if it be true, as is pretended, that these three very essential qualities are possessed in the highest possible degree by a system in which units are grouped by pairs, these pairs again by pairs, these higher pairs by dozens, these dozens by scores, and these scores by tens, hundreds, and thousands, &c., then it is impossible to deny that it would be a vast improvement to arithmetic to follow the same principle out wherever number is concerned, since distinctness of conception and facility of recollection are in themselves most desirable things, and since whatever gives readiness to mental calculations must tend in many cases to dispense with pen work, and in all, materially to aid it, all calculation being mental, and whatever system aids the mind habitually to make the longest steps with equal security being practically the best system. We ought, therefore, to burn our books of arithmetic, and adopt that system of numeration (the monetary system) up to 960, retaining the Decimal scale for higher numbers, or rather after the scores, to recur again to the pairs, pairs, dozens, and scores, in regular order of succession *ad infinitum*. Now (putting the question of practicability of such a change quite aside), I do not think anybody will be found to agree to such a conclusion. They will at once fall back on the "regularity of the Decimal System." And why? Because it is precisely this regularity—precisely this habit of forming numbers mentally into groups of ten and rejecting all others which is found, most of all, to secure clearness, facility, and readiness of calculation both mental and graphical.

12. (1.) *Ex. gr.:* Which is the more easy for Conception, for Recollection, or for Addition mentally?—

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

(2.) Again; we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 375 mils?

(3.) The half of 2*s.* 6*d.* is 1*s.* 3*d.*; but what is the half of 2*s.* 6*d.* estimated decimally, *i. e.* 125 mils, &c. &c.?

Answer. It is not easy to exhibit in a few words all the onesidedness of this question, or to answer it in the spirit of fair discussion. I will remark, however, 1st, that it takes for granted the present system as the established and habitual one, and throws all the onus of approximations and uncouthness of expression on the new-comer. 2dly, that it deals only with cases of ease to the existing system, and of awkwardness to the Decimal. 3rdly, That nine of the cases exemplified take no cognizance of the farthing, while they expect the decimal corresponding ones to take account of mils. The best sort of answer to questions proposed on such principles is to reverse the position, to assume the Decimal System to be the established one, and the £ *s. d.* system a candidate for introduction, and to put parallel questions, such as,—

(1.) Which is the more easy for Conception, for Recollection, or for Addition mentally:—

Mils.		*s.*	*d.*		*d.*		qrs.
390	=	7	$9\frac{1}{2}$	=	$93\frac{1}{2}$	=	374
170	=	3	$4\frac{3}{4}$	=	$40\frac{1}{4}$	=	163
40	=	0	$9\frac{1}{2}$	=	$9\frac{1}{2}$	=	38
600		11	$11\frac{3}{4}$		$143\frac{3}{4}$		575

(2.) Again, we know at once that the half of 466 mils is 233 mils; but what is the half of 9*s.* $3\frac{1}{4}$*d.*?

(3.) The half of 124 mils is 62 mils; but what is the half of 124 mils estimated in £ *s. d.*, viz. 2*s.* $5\frac{3}{4}$*d.* and $\frac{1}{25}$ qr?

(4.) Take another case. Any number of yards—7, 8, or 9 yards at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 mils per yard:

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market?

(5.) Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person, in his head, without pen and ink or pencil, and in the midst of confusion?

(4.) Any number of yards—say 7, 8, or 9, at 40 mils, 60 mils, 80 mils, or the same number at 9*d.* 2 qr $\frac{2}{5}$, 1*s.* 2*d.* 1 qr $\frac{3}{5}$, 1*s.* 7*d.* 0 qr $\frac{4}{5}$ per yard? which calculation will be made with the greatest readiness and accuracy mentally and in the open market?

(5.) Take 60 mils—double it—triple it—halve it—divide it by 3 and by 5, and add all the products together. Is not this easily done by any common person, &c. &c.?

(6.) But try the same process upon the same sum in Decimal notation, namely, as 125 mils. Will the calculation be equally simple and easy?

(7.) Now try it in pence, namely, as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy?

(8.) Again: Price's Patent Candles are advertised in 12lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally? 12lb. boxes at 5·50 mils each; how much per lb.?

(9.) Again:

	s.	*d.* Pence.	Mils.	
1 yard or lb.	=2	6	=30	= 124, for more easy calculation than 125 mils
$\frac{1}{2}$ do.	= 1	3	= 15	= 62
$\frac{1}{3}$ do.	= 0	10	= 10	= impossible.
$\frac{1}{4}$ do.	= 0	$7\frac{1}{2}$	= $7\frac{1}{2}$	= 31
$\frac{1}{6}$ do.	= 0	5	= 5	= impossible.
$\frac{1}{8}$ do.	= 0	$3\frac{3}{4}$	= $3\frac{3}{4}$	= impossible.
$\frac{1}{10}$ do.	= 0	3	= 3	= impossible.
$\frac{1}{12}$ do.	= 0	$2\frac{1}{2}$	= $2\frac{1}{2}$	= impossible.
$\frac{1}{15}$ do.	= 0	2	= 2	= impossible.
$\frac{1}{24}$ do.	= 0	$1\frac{1}{2}$	= $1\frac{1}{2}$	= impossible.
$\frac{1}{30}$ do.	= 0	1	= 1	= impossible.

Now, consider the comparative convenience in making the necessary payments.

	Mils.	
$\frac{1}{10}$ do.	= 60	= impossible.
$\frac{1}{12}$ do.	= 42	= impossible.
$\frac{1}{14}$ do.	= 35	= impossible.
$\frac{1}{15}$ do.	= 28	= impossible.
$\frac{1}{20}$ do.	= 21	= impossible.
$\frac{1}{21}$ do.	= 20	= impossible.
$\frac{1}{28}$ do.	= 15	= impossible.
$\frac{1}{30}$ do.	= 14	= impossible.
$\frac{1}{35}$ do.	= 12	= impossible.
$\frac{1}{42}$ do.	= 10	= impossible.
$\frac{1}{60}$ do.	= 7	= impossible.
$\frac{1}{70}$ do.	= 6	= impossible.
$\frac{1}{84}$ do.	= 5	= impossible.
$\frac{1}{105}$ do.	= 4	= impossible.
$\frac{1}{140}$ do.	= 3	= impossible.
$\frac{1}{210}$ do.	= 2	= impossible.

(10.) 2*s.* 6*d.* is paid with one coin. How many coins will be required to pay 124 mils?

(11.) 1*s.* 3*d.* is paid with two coins. How many coins will be required to pay 62 mils?

(12.) Is it not by cases of this kind that the relative convenience of different systems of Coinage must be tested?

13. (1.) The defectiveness of any system founded on the Decimal Principle consists in the imperfect divisibility of its integers.

(2.) Is not the construction of Coinage necessarily a divisional process?

(3.) Is it not the metrical subdivision of the integer for fractional payments in connection with retail transactions?

(4.) "While decimal arithmetic for the purposes of computation shoots spontaneously from the nature of man and

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(6.) But try the same process on the same sum in £ *s.* *d.* notation, namely, as 1*s.* 2*d.* $1^{qr}\frac{3}{5}$, Will the calculation be equally simple and easy?

(7.) Now try it in pence; viz., at $14\frac{2}{5}d$ Is it a bit more easy?

(8.) Again: Price's Patent Candles under a Decimal System fully established, would be advertised in 10lb. boxes at 46c. each. Every one knows that this would give 46m. per lb. for the candles, but what will the calculation be in £ *s.* *d* —10lb. boxes at 9*s.* 2*d.* 1 qr. $\frac{3}{5}$ each? How much per lb.?

(9) Again:

	Mils.	*s.*	*d.*	
1 yard or lb.	= 420	= 8	4 $3^{qr}\frac{1}{5}$	$= 402^{qr}$, for more easy calculation than $403\frac{1}{5}$.
$\frac{1}{2}$ do.	= 210	= 4	$2\frac{1}{4}$	$=201^{qr}$
$\frac{1}{3}$ do.	= 140	= 2	$9\frac{1}{2}$	=134
$\frac{1}{4}$ do.	= 105	= impossible.		
$\frac{1}{5}$ do.	= 84	= impossible.		
$\frac{1}{6}$ do.	= 70	= 1	$2\frac{3}{4}$	$= 67^{qr}$
$\frac{1}{7}$ do.	= 60	= impossible.		

Now consider the comparative convenience in making the necessary payments.

(10.) 124 mils would probably be paid in three coins; but 124 mils is not the equivalent of half a crown—the eighth of a pound. Were it thought right (and on the principle of an approximation to a binary sub-coinage, some might think it so). A coin of 125 mils might circulate with no greater inconvenience than the half-crown at present, concurrently with the florin.

(11.) Three perhaps—or thus; 30^{m} is paid in one coin. How many coins will it take to pay $7\frac{1}{4}d.$?

(12.) Assuredly not. Such comparisons can never by possibility arise, except in the brief interval of transition from one system to another. They vanish when either is established. Besides they are onesided, and therefore *pro tanto* unfair; and it is not by questions capable of being so qualified that the merits of any proposal can be tested.

(1.) This is, in a few words, a faithful summing up of all that can be urged against the Decimal Principle in general. If the divisibility of the base of a system of numeration into many factors increased in the least degree the divisibility of numbers in general, it would have much weight. But 41 is quite as incapable of aliquot division, and 143 quite as incapable of being resolved otherwise than into 11's and 13's, whether these numbers be expressed decimally, duodecimally, or in any other way. Even taking the much-vaunted system of duodecimal arithmetic, its real advantages, if adopted, would be: 1st, that numbers would be written somewhat more concisely. 2ndly, that it would be as easy, by inspection, to tell whether a given number is divisible by 11 or 13, as in the Decimal System it is to tell whether it is divisible by 9 or 11, and a trifle more easy to tell whether it is so by 3 or by 9, and that $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{9}$ would not require to be expressed by repeating duodecimal fractions, though $\frac{1}{5}$ would. But on the other hand, it would not be possible, without actual trial, to say whether it could be divided by 5. Other advantages I really know none, except that dozens would be spoken of oftener and scores seldomer than at present. Six would be called half a dozen, but 4 would not be called the third of a dozen, &c. &c.

(2.) Yes.

(3.) I do not understand the question. See answer to Question IV., if "metrical" be omitted.

(4.) This is an opinion and an assertion, and may, therefore, be quite logically met by a counter-opinion and a counter-assertion; but let

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" things, it is not equally adapted to the " numeration, the multiplication, or the " division of material substances."— J. QUINCY ADAMS, *Secretary of State. Report to Senate of United States*, 1821, p. 8.

us examine both the one and the other. What is computation other than numeration, multiplication, and division, &c.? What is number itself other than an abstraction drawn almost entirely from the contemplation of material substances? How does decimal arithmetic shoot spontaneously from the nature of man and things otherwise than that man, having ten material substances convenient for the purpose always before him, uses them to count with? Had he 12, a duodecimal arithmetic would equally have arisen. There is a natural facility for dividing some sort of material substances (not all) equally into 2 parts, but not into 3, 5, 7, 11, &c. No system of computation can facilitate the division of material groups in general into more simple groups, though one may enable us to say more readily than another whether any particular group is resolvable into a particular class of sub-groups. In numbers, in general, there are more groups of 2's than of 3's, more of 3's than of 4's, of 4's than of 5's, more of 5's than of 6's, and so on. Now the decimal system enables us to say at once whether a number consists of either of these five most common groups. But the duodecimal does not give us this ready information.

14. In the following table compare the three systems, the present, the mil, and the penny system. With which does the superiority rest as regards,—

(1.) Number of figures used?
(2.) Conciseness of expression in words or in writing?
(3.) Facility for mental conception of the sum stated?
(4.) Tendency to promote accuracy in copying or calling over?
(5.) Facility for calculations, especially those which must be made in the head?
(6.) Interchangeability at equivalent value with the coins now in use?

£	s.	d.		Mils.		Pence.
1	0	0	=	1,000	=	240
	17	8	=	883	=	212
	15	6	=	775	=	186
	9	9	=	487	=	117
	6	3	=	312	=	75
	5	7	=	279	=	67
	4	10	=	241	=	58
	3	8	=	183	=	44
	2	4	=	112	=	28
	1	5	=	70	=	17
4	7	0		4,342		1,044
27 figures.				34 figures.		28 figures.

Answer. (1.) Number of figures used. The example is by no means a fair one. See Question 1, Answer (*b.*), also Question 12—Remark. If the equivalent mil account had been stated to the nearest half-cent. thus, 100c. 88c·5, &c., it would have required only 29 figures. The mils set down in the example proposed are erroneous if intended to be the nearest equivalents of the £ *s. d.* items, and the errors are such as to produce an incorrect sum total, obviously not the equivalent of 4*l.* 7*s.* The correct figures are as follows, giving sums obviously the correct ones :—

In Mils.	In Cents.
1,000	100
883	88·5
775	77·5
488—	48·5
312+	31·5
279	28
242	24
183	18·5
117	11·5
71	7
4,350	435
34 figures	29 figures.

The difference in the number of figures is only 1 to the disadvantage of the cents as compared with pence, and 2 as compared with the £ *s. d.*— no great matter, considering that the example is a selected one, with no farthings.

(2.) Conciseness of expression in words or writing. There is so little difference that it is really difficult to say. But had there been, as in fairness there ought to have been, farthings, the decision would have been in favour of the Decimal System.

(3.) Facility of mental conception.—Decidedly in favour of the cents as compared with the £ *s. d.* As regards the pennies it is not the practice to express our money in pennies ; nor could such a practice ever be introduced as to make the penny a money of account, retaining the pound sterling and the existing coinage.

(4.) Tendeney, &c.—Decidedly in favour of the mils as compared with £ *s. d.*

(5.) Facility of calculation, &c.—The same ground of protest : cases of ease are compared with cases of difficulty. The only refuge of a respondent to such a question is a counter-question, reversing the situation. Of *these*, which affords the greater facility for calculation, especially, &c. &c. ?

(6.) Interchangeability of value with the coins in use. This is again a question which must be replied to in the same way. The figures here set down suffice to exemplify the complete reversal of the result with the change in the point of view.

Cents.		£	s.	d.
100	=	1	0	0 —
78	=	0	15	7¼—
56	=	0	11	2½—
38	=	0	7	7¾—
24	=	0	4	9½+
10	=	0	2	0 —
6	=	0	1	2½—
3	=	0	0	7¼—
2	=	0	0	4¾+
1	=	0	0	2½—
318		3	3	7½—

(7.) If we now proceed to subject these total sums to division, which system will be found the most convenient?

(7.) The errors being rectified in the items of the proposed question, the total sums (4350m. or 435c.) are just as easy of division as that of the pence (1044), indeed, easier ; for the divisibility by 5 is obvious on the cents ; that by 5 or by 2, or by 10, on the mils ; and that by 3 on both. 1,044, indeed, is divisible by 9, which 4,350 is not ; but then 1,044 is not divisible by 5, or thus, 1,044 × 4 = 4,176, has three prime factors, 2, 3, and 29, while 4,350 has four, viz., 2, 3, 5, and 29. This is as regards the penny system,—as to 4*l.* 7*s.* ; in that form it is not divisible at all. Nobody, without reduction, would suspect it to be divisible by 9, though every body would see that 4,350m. is so by 3 or by 5.

(8.) 4*l.* 7*s.*, divided by 3, 4, 6, and 12, gives the respective sums, 1*l.* 9*s.*, 1*l.* 1*s.* 9*d.*, 14*s.* 6*d.*, 7*s.* 3*d.* Pence 1,044, divided by 3, 4, 6, and 12, gives the respective sums of 348 pence, 261 pence, 174 pence, 87 pence.

But 4,342 mils is not divisible without a remainder by any of these divisors.

(8.) Those who found arguments on the results of their calculations should be sure of their figures. But the point is not worth contending for, were they correct. If they were so, they would afford an infinitesimal argument in favour of the system of a penny account (which is not the question), viz., that of one favourable case out of the infinite multitude of proposable cases. See Answer to Question 10, which disposes finally of all such arguments.

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15.

		s.	*d.*		Pence.		Mils.
1 £	=	20	0	=	240	=	1,000
$\frac{1}{2}$ £	=	10	0	=	120	=	500
$\frac{1}{3}$ £	=	6	8	=	80	=	—
$\frac{1}{4}$ £	=	5	0	=	60	=	250
$\frac{1}{5}$ £	=	4	0	=	48	=	200
$\frac{1}{6}$ £	=	3	4	=	40	=	—
$\frac{1}{7}$ £	=	—		=	—	=	—
$\frac{1}{8}$ £	=	2	6	=	30	=	125
$\frac{1}{9}$ £	=	—		=	—	=	—
$\frac{1}{10}$ £	=	2	0	=	24	=	100
$\frac{1}{11}$ £	=	—		=	—	=	—
$\frac{1}{12}$ £	=	1	8	=	20	=	—
$\frac{1}{13}$ £	=	—		=	—	=	—
$\frac{1}{14}$ £	=	—		=	—	=	—
$\frac{1}{15}$ £	=	1	4	=	16	=	—
$\frac{1}{16}$ £	=	1	3	=	15	=	—
$\frac{1}{17}$ £	=	—		=	—	=	—
$\frac{1}{18}$ £	=	—		=	—	=	—
$\frac{1}{19}$ £	=	—		=	—	=	—
$\frac{1}{20}$ £	=	1	0	=	12	=	50

(1.) By this table it appears that going down as far as the shilling the £ is divisible under our present system, and under the penny system, into eleven distinct aliquot parts; whilst under the mil system, it is divisible only into six aliquot parts.

(2.) But observe further the sub-divisibility of the quotients obtained under the present and the penny system, compared with those obtained under the mil system.

(3.) The $\frac{1}{8}$ £ represented by 2*s.* 6*d.* or 30 pence, or 120 farthings, is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, giving respectively 1*s.* 3*d.*, 10*d.*, 7$\frac{1}{2}$*d.*, 6*d.*, 5*d.*, &c.; whilst the same sum represented by 125 mils is divisible only by 5 and 25, giving as the result 25 mils and 5 mils.

(4.) Again: the $\frac{1}{10}$ £, represented by 2*s.* or 24 pence, or 96 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48, giving respectively 1*s.* 8*d.*, 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1$\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, and $\frac{1}{2}$*d.*; whilst the same sum, represented by 100 mils, is not divisible into a third or an eighth part, or any of their subdivisions.

(5.) The same may be said again of the shilling, which, represented by 12 pence or 48 farthings, may be divided by 2, 3, 4, 6, 8, 12, 16, 24, giving respectively the sums 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1$\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, $\frac{1}{2}$*d.*: whilst the same shilling, divided into 50 mils, is divisible only by 2, 5, and 25, giving the sum 25 mils, 5 mils, and 2 mils.

(6.) Now let us compare the three systems with reference to the number of figures requisite for stating the fractions of a £ which are obtainable under each of the three systems:—

		s.	*d.*		Pence.		Mils.
1 £	=	20	0	=	240	=	1,000
$\frac{1}{2}$ £	=	10	0	=	120	=	500
$\frac{1}{4}$ £	=	5	0	=	60	=	250
$\frac{1}{5}$ £	=	4	0	=	48	=	200
$\frac{1}{8}$ £	=	2	6	=	30	=	125
$\frac{1}{10}$ £	=	2	0	=	24	=	100
$\frac{1}{20}$ £	=	1	0	=	12	=	50
		2	4	6	544		2,225
		19 figures.			19 figures.		25 figures.

Answer. Aliquots of a pound as expressed in £ *s. d.*, pence, and mils. This is fair argument (at least as far as P. 5.) It is admitted that the Decimal System carried to mils has fewer absolute aliquots of the unit of account in it than the £ *s. d.* system. *Valeat quantum.* After all, it is no disadvantage worth speaking of. The chief use of these aliquots is to facilitate the arithmetical rule of "Practice"—a rule of short cuts and expertnesses, which is cast aside in the Decimal System as not worth the trouble of acquiring. Anybody who has to pay 3*s.* 4*d.*, or to bargain for 1*s.* 8*d.* per yard, cares very little whether the sums are aliquots of a pound or not.

As to the sub-aliquots or aliquots of aliquots—no doubt for "practice" they are useful. But observe, that in the mil system, such numbers as 30, 60, 120, 180, 42, 84, 96, 210, 420, &c., which have many aliquots, present themselves on the face of sums. Whereas on the £ *s. d.* system, 2*s.* 6*d.* has to be turned into sixpences or pennies or farthings to perceive its divisibility, and in such sums as 8*s.* 9*d.*, the divisibility by 5, 7, 14, 28, is so concealed that nobody would perceive it without reduction to units of one denomination. The £ *s. d.* system is one which almost studiously conceals divisibility by 5, 7, 9, 11.

(6.) See the Answer to Question 12 in general, and as to the omission of farthings while retaining mils. If (as fairness of statement requires) the decimal account were kept to the nearest half-cent, the figures on the decimal side (including the sum total) would be 19, on a par with the others. But the object of the question being merely to compare the number of figures requisite for stating the aliquots, the sums total ought not to be included, and then the advantage is one figure in favour of the decimal statement over both. Or, if the £ *s. d.* aliquots were written (as fairness requires) so as to express that there are no odd farthings, thus 20*s.* 0*d.* 0*qrs.*, 240*d.* 0*qrs.* there would be in each case (including the sums) 27 figures, to 25 in the decimal expression, or (omitting the sum) 23 figures in the £ *s. d.* system to 21 in the mil system.

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16. Is the introduction of the Decimal Principle into our coinage desirable without reference to what may be the system of weights and measures in this country?

Answer. I think so, on the homely principle that a slice of a loaf is better than no bread. I am persuaded that under all systems of weight and measure, not studiously perverse, goods would quite as easily be bought and sold, and paid for in a decimal or in any other currency when once familiar and established, and there had been time for the habitual compromise between the niceties of price and the niceties of currency, which is sure to take place in an established system. To bargain for three ounces avoirdupois of a commodity at five or at seven units per lb. is as great a difficulty, whether the units be pence, cents, or groschen. However, it is admitted on all hands that more than half the advantage of a Decimal System of money would be wanting if not accompanied, or followed by one of weights and measures. Nevertheless, that a Decimal System can work with perfect ease and satisfaction in conjunction with the present British system of weights and measures, is demonstrated by the instance of the United States, whose system of weights and measures is identical with our own.

17. Commodities are divided for the retail purposes of the market by means of our weights and measures, and the practical purpose of coins is to effect the payment for those retail purchases. Can the adjustment of our system of coinage be properly disconnected from the adjustment of our system of weights and measures?

Answer. *Vide* Answer to the last question, and to Question IV. (2). No doubt however, that if a Decimal System of currency were adopted, it would be highly desirable to carry out the same system into weights and measures.

18. At present our system of weights and measures, and our system of coins, may be considered as Binary. Can it prove consistent with public convenience to abandon the Binary, and to adopt the Decimal System in our coinage, unless we have decided on the same course in our system of weights and measures?

Answer. No doubt the Binary element enters largely into our systems, though I should hardly consider them as Binary systems. But granting that, adopt what system you will in weights and measures, the "half" and "quarter" of the most usual unit, as the yard, or the pound, or the gallon, will be very frequently asked for, still in the scale of currency from 1 to 1000 mils, there is room for a large variety of binary scales, as 1, 2, 4 mils, &c., 3, 6, 12 mils, &c., 5, 10, 20 mils, &c. And for those commodities which are most frequently called for in binary aliquots, the prices will naturally adjust themselves so as to allow of exact payment in the coinage adopted.

19. If the retail transactions of the community originate in a system of weights and measures, by which the hundredweight is divided into 4 quarters, the quarter into 28 pounds, and the pound into 16 ounces; and in which, again, the lineal measure, the yard, is divided into 3 feet, and the foot into 12 inches, will a coinage, founded on the Decimal Principle of division, afford greater facility for the adjustment of such retail transactions than the coinage which now exists?

Answer. The price per ounce by retail is hardly ever (probably never) one 1792d part of the price per cwt., or one 448th of that of a quarter of 28lbs. To pass from 28lbs. to 1lb. is no easier in the £ *s. d.* than on the Decimal System. Those commodities which are usually sold by the yard are never asked for in feet. No lady, I suppose, ever went into a shop to buy 13 feet of ribbon; she would ask for 4½ yards, though there would be 6 inches of waste. I do not suppose that the Decimal System would afford greater facilities than the present for our system of weights and measures in retail.

20. Take the case of an article now selling at a shilling per pound or per yard, and retailed in halves, quarters, ounces, or inches, these fractional quantities are easily and readily paid for in our present coins. But if our Coinage be subjected to the Decimal Principle of division, will not that facility be lost?

Answer. (Report 1853, Decimal Commission, Question 1020). Mr. Lindsay's Evidence (grocer and tea dealer). Is a shilling a very common price for articles? *Ans.* Not in our business. (Preliminary Report on Decimal Coinage 1857,) Question 362. Dr. Gray's Evidence.—Dr. Gray gives "a list of the articles exhibited in a mercer's window, High Street, Islington, on May 13, 1856, with the prices in our present coinage, and how they will be marked should the £ and mil system come into use." The articles are 50 in number, varying in price from 19*s.* 6*d.* to 2¾*d.*, and among them is only one priced at 1*s.*, viz. "lawn per yard," and only one other priced at an exact number of shillings. Of this list, the majority consists of indivisible articles, but among them are 20 divisible, or on sale "per yard," and of these only two are priced at an exact penny, while 18 have odd halfpence or farthings. And among all the 50 there is only one (1*s.*), which is an aliquot part of a pound. Dr. Gray, in reference to the mil prices annexed, observes,—"I can well conceive the feelings of the lady customers on seeing the prices so marked," assuming them to be impressions of disgust. To one habituated to the Decimal System, however, quite as intense an impression of a similar nature would arise on sight of the prices in £ *s. d.* actually affixed. Such being retail, it is needless refinement to insist on those cases of easy subdivision and aliquots in the presence of vast and important general considerations. They are utterly overwhelmed and swept away in the mass of petty give-and-take transactions, which occur in buying and selling over the counter; and among the number of considerations which weigh in the mind of a shopkeeper in deciding upon the ultimate farthing or mil which he shall demand, or of his customer which he shall haggle upon, I do not believe either party ever attributes the smallest weight to their consideration. In reply to the question, therefore, I can only say that I do not believe any facility of the sort, worth speaking of, will be lost by adopting the Decimal Principle. So long as we pay by tale and not by weight, so long will there exist this margin of uncertainty and haggling.

21. Under our present system,—

		Mils.	Pence.
1 lb.	= one shilling	50	12
$\frac{1}{2}$ lb.	= sixpence	25	6
$\frac{1}{4}$ lb.	= threepence	12·5	3
$\frac{1}{8}$ lb. or 2 ounces	= three halfpence	6·25	$1\frac{1}{2}$
$\frac{1}{16}$ lb. or 1 ounce	= three farthings	3·125	$\frac{3}{4}$

In cases of this kind, will the ordinary transactions of the market be carried on under a Decimal System with simplicity or convenience comparable to that which is obtained by the present system ?

Answer. See answer to the last question The Decimal System once established, I do not conceive that there would be any difference of facility worth mentioning.

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22. Would a change from our present to a Decimal System of Notation and of Coins secure any advantages in Brevity of Expression, in Facility of stating Accounts, in Simplicity of Form, in Speed or Accuracy of Calculation, or in Facility of Payments ?

Answer. See the answer to Question 2 (*b*) and (*d*), and the Note. As to facility of payments, only the difference between mils and farthings,—the mils admitting of a closer approximation to any non-exact value, as being smaller fractions of 1*l.*

23. In the Report of the discussion, at the Institution of Civil Engineers, of Mr. Yates' Paper on the French system of Measures, Weights, and Coins, the following passage occurs (p. 60) :—

"The pound sterling, consisting of 960 " farthings, admits of 19 divisions* without a remainder ; but if divided into " 1,000 parts, it only admits of 8 divisions. Existing Weights and Measures " are chiefly reckoned by 2, 4, 8, 12, 20, " 24, 36, &c., which admit of divisions by " existing monies ; but if a monetary " decimal system be adopted, without also " adapting it to weights and measures, " it must be evident that the number of " fractions will be greatly multiplied. " Decimal coins will not accord with the " fractions of a pound of 16 ounces, nor " with those of a yard of 36 inches. Purchases of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, &c. of any integer " could not be paid for decimally without " incurring a loss by fractions not represented by Coins. Now those are precisely the quantities in which the " working classes principally make their " purchases ; consequently they would be " the chief sufferers by the introduction " of a Decimal Coinage, unless there is " a simultaneous adoption of Decimal " Weights and Measures. This anomaly " was severely felt in the United States, " and to obviate the inconvenience Spanish " pieces of $6\frac{1}{4}$ and $12\frac{1}{2}$ cents, although illegal coins, were of necessity employed."

Must the truth and force of this statement be admitted, or, if not, what answer can be given to it ?

Answer. See answer to Question 20. Mr. Yates omits the divisor 7 in his enumeration. It needs only to consult any priced list to be satisfied of the small percentage of cases to which this argument from aliquot subdivision applies. As regards the $6\frac{1}{2}$ and $12\frac{1}{2}$ cent pieces in America, it should be observed that the American cent is $\frac{48}{100}$ of a shilling (taking the dollar at 4*s.*), or almost exactly $\frac{1}{2}$ penny. If then the exigencies of American Retail required the use of the farthing, or its equivalent the half-cent, at a time when there was no such coin as a half-cent, there was no remedy but to resort to a foreign coin. There is no doubt that in New York, and perhaps in other great cities in the United States, as in our own, the farthing is wanted. [The fare of an omnibus in New York is $6\frac{1}{2}$ cents, and is probably usually paid in such a coin as Mr. Yates mentions, but that a Spanish copper coinage can pervade the Union as a matter of necessity, is quite incredible.] In fact, it appears from Mr. Snowden's Report to the Secretary of the United States Treasury, (Prelim. Rep. Dec. Comm. 1857, p. 340,) that there exist now abundance of half-cents which have been coined by the United States mint. This circumstance proves that the American unit of value (the dollar) is just double what the exigencies of commerce require, and that the florin, whose centesimal is about the minimum coin required (or the pound, whose millesimal is so,) is the better unit. As regards the arguments for aliquots and for the binary and tertiary system of subdivision, see also M. Michel Chevalier's Letter to Lord Monteagle, (Rep. 1857, p. 211,) which renders further reply superfluous.

As to the practical inconvenience of a Decimal System in money, and not in weights and measures, see Mr. Everett's reply to Questions 25 and 26 of the Circular of H. M. Commissioners. (Rep. 1857, p. 339.) As regards the $12\frac{1}{2}$ and $6\frac{1}{4}$ cent pieces (called $6\frac{1}{2}$), see his reply to Question 23 (p. 338). As to any "practical inconvenience" produced by the retention of these coins, see Mr. Ewart's Letter to Mr. Baily. (Prelim. Rep. 1857, 342.) Be that as it may, it appears they are about to be called in, and their use suppressed as a nuisance. (Snowden to Mintern.)

24. (1.) In the retail transactions of the Shop or Market, is not division into halves, quarters, thirds, eighths, twelfths, &c. more convenient, and more in unison with the natural habits of mankind, than the division into tenths ?

Answer. (1.) Halves and quarters are natural subdivisions. Nature affords ready means of halving many things, lengths, weights. But not so of thirds or fifths. And accordingly nobody ever goes to buy "a third of a pound," or even the "third of a yard," though there is a measure to represent it.

(2.) "The decimal numbers, applied to the " French weights and measures, form one " of its highest theoretic excellences. It " has, however, been proved by the most " decisive experience in France, that they " are not adequate to the wants of man " in society, and, for all the purposes of " retail trade, they have been formally

(2.) The reason why these Spanish coins were retained in use has been explained in answer to Question 23. It was because the American unit (4*s.*) was pitched too high for a centesimal subdivision, and too low for a millesimal. From the testimony of Messrs. Snowden, Everett, and Eward above referred to, it appears that these remarks of Mr. Quincy Adams (in 1821) are now

* Qy. 960 admits of 27 divisions, not 19 ; 1,000 of 15 divisions, not 8.

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" abandoned. The convenience of Deci-
" mal arithmetic is in its nature merely a
" convenience of calculation; it belongs
" essentially to the keeping of accounts,
" but is merely an incident to the trans-
" actions of trade. It is applied, there-
" fore, with unquestionable advantage, to
" monies of account, as we have done;
" yet, even in our application of it to
" the Coins, we have not only found it
" inadequate, but in some respects incon-
" venient. The divisions of the Spanish
" dollar, as a Coin, are not only into
" tenths, but into halves, quarters, fifths,
" eighths, sixteenths, and twentieths. We
" have the halves, quarters, and twen-
" tieths, and might have the fifths, but
" the eighth makes a fraction of the cent,
" and the sixteenth even a fraction of a
" mil. These eighths and sixteenths form
" a very considerable proportion of our
" metallic currency, and although the
" eighth, dividing the cent only into
" halves, adapts itself without incon-
" venience to the system, the fraction of
" the sixteenth is not so tractable; and
" in its circulation, as small change, it
" passes for six cents, though its value is
" six and a quarter, and there is a loss by
" its circulation of four per cent. between
" the buyer and the seller. For all the
" transactions of retail trade, the eighth
" and sixteenth of a dollar are among the
" most useful and convenient of our Coins;
" and, although we have never coined
" them ourselves, we should have felt the
" want of them, if they had not been sup-
" plied to us from the Coinage of Spain."
—QUINCY ADAMS'S *Report to Senate of United States*, 1821, p. 81.

out of date, half-cents being in circulation. Mr. Snowden proposes to abolish them for the singular reason that "they are useless, because no one will take the trouble to make a cent with two pieces of money;" and the Government has acted on the suggestion, (New Coinage Law of Jan. 15, 1857,) and at the same time called in the $12\frac{1}{2}$ and $6\frac{1}{4}$ pieces, which is equivalent to declaring that the half-cent is no longer required in American retail, whatever it might be in 1821, when Mr. Adams wrote the Report cited. See also answer to Question 53, (1) and (2).

25. The late Lord Ashburton, in a debate in the House of Commons on this subject, remarked, "That the capacity of division by " halves and quarters which attends our shil-" lings is extremely convenient for the common " purposes of life, which upon the whole is the " best criterion of any system." Is this correct or otherwise?

How is the shilling expressed as 50 mils to be divided into quarters, or the sixpence expressed as 25 mils to be divided into halves?

Answer. The only answer this admits of is, that the capacity of the shilling for division into 5 cents, and each of them again into 10 mils, will also no doubt be found convenient for the common purposes of life, if we may quote the experience of those countries which have a Decimal Coinage.

26. It is stated by Sir John Herschel, in his Evidence before the Committee of the House of Commons, (Qu. 594,) that in his opinion "it is " a great misfortune that Decimal Coins will " never fit the fractions of a yard and of " pounds and of measures." Must we concur in that opinion; and if so, must we concur in the further view of Sir John Herschel that, "a " Decimal System of Weights and Measures, " as well as of Coins, ought to form a part of " the same integral system"?

Answer. I retain both these opinions, but I must protest against their being drawn into an argument against the adoption of a Decimal System of money. 1st, as regards the arithmetical want of fitting. To take a parallel case. It is a great misfortune, as regards the theory of harmony and the practice of music, that the series of powers of $\frac{2}{3}$ and of $\frac{1}{2}$ are non-coincident, and that in consequence no scale of perfect fifths will coincide exactly with any scale of perfect octaves, by reason of which there can be no perfect harmony. But this does not prevent our making excellent music, by allowing a little adjustment or "temperament" to bring the notes together. As regards the other part of the question, see answer to Question 27.

27. In the evidence given before the House of Commons, Sir John Herschel gives his opinion, that the Decimalization of Weights and Measures and of Coins should go hand in hand (Qu. 598); but if that be impracticable, he inclines to the opinion that Decimalization of Weights and Measures should be a step towards that of Coinage. (Qu. 600.)

Professor De Morgan would adopt a Decimal Coinage first, leaving the other (Decimal Weights and Measures) for a future period. (Qu. 769.)

Mr. Airy thinks that the adoption of a Decimal system of Weights and Measures desirable

Answer. As it appears that there is a diversity of opinion about the order of adoption among parties who yet agree that both should be adopted, I consider the correct view to be contained in the precept, "*Hoc age.*" Waive the discussion of priority, and act in the matter in hand. I do not consider the adoption of a Decimal System of Weights and Measures essential to the usefulness of a Decimal System of money. I think it would be better if that of Weights and Measures could be introduced first; but that it would at all events be an improvement to have the money decimalized, even without the weights and measures. The more so, that it appears by M. Michel Che-

to some extent, and probably concurrent with the Binary system. (Qu. 481.)

What is the correct view on those points? Is the adoption of a Decimal system of Weights and Measures essential to the efficiency and usefulness of a Decimal Coinage? Ought it to precede, to accompany, or to follow, as a necessary consequence, the introduction of Decimal Coinage?

valier's evidence, that the resistance to be expected to the former is less than to the latter.

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28. (1.) Is it not the fact that next to addition, the most important operation performed on numbers representing broken sums of money is the finding the price of a broken quantity of material when the price of a given unit of the material is a given broken sum?

Answer. (1.) Admitted.

(2.) Is not this operation in theory the multiplication of a broken quantity of material by a broken sum of money? Is it not usually performed, and with great facility, by the rule denominated "Practice"?

(2.) Yes, as to the theory. As to the facility of "Practice," it is easy, *with practice.* Some are more expert at it than others. There is a certain readiness which makes it easy to those whose turn of mind it suits. Some have great difficulty in applying it, and I believe nine persons out of ten who can add up £ *s.* *d.* correctly, would be puzzled by the example here set down. If it occurred to myself, I should probably decimalize both the weights and measures, and multiply.

(3.) Is it not the fact that one of the great advantages of a completely Decimal System of Money, Weights, and Measures would be that such operations would be performed by simple Multiplication? Is it not the fact that this result would not be attained unless weights and measures were decimalised as well as money?

(3.) Such no doubt is one of the great advantages of the Decimal System of Money, Weights, and Measures. It would not be completely attained without a decimalization of the latter. But it would partially; for instance, in the sum proposed I should find the decimalization of the money done to my hand.

(4.) If money alone were decimalised, would not such operations be still performed by "Practice," and would the operations be much or at all simplified?

(4.) That I very much doubt; and I am not sure that the operations are simplified, though they may be made to look shorter on paper by leaving out a good deal of the work. I apprehend that in business such sums as the example do not very often occur, and that if there be a business in which they do, recourse must, I suppose, be had to a certain useful book called the "Ready Reckoner," or to special tables kept in the counting-house. Indeed, I think it would be safe to say that if they did occur frequently, and had to be worked by practice, commercial business could not be carried on

(5.) Take, for example, the following case, given by Sir Charles Pasley in his Evidence before the Committee of the House of Commons, as showing the advantage of the Decimal System.

215 tons, 17 cwt. 3 qrs. 9 lbs. at £9 11*s.* 6¼*d.* a ton. Under the present system we should say—

215 tons, 17 cwt. 3 qrs. 9 lbs.,

		£	*s.*	*d.*	
at £1 per ton	=	215	17	10	— $\frac{1}{28}$
at £8 „	=	1,727	2	8	— $\frac{8}{28}$
at 10*s.* = $\frac{1}{2}$	=	107	18	11	— $\frac{1}{56}$
1*s.* = $\frac{1}{10}$	=	10	15	10	$\frac{7}{10}$
6*d.* = $\frac{1}{2}$	=	5	7	11	$\frac{3}{10}$
¼*d.* = $\frac{1}{24}$	=	0	4	6	
at £9 11*s.* 6¼*d.*	=	£2,067	7	8½	

(5.) In the working of this sum in £ *s.* *d.* by practice, as here set down, there are 55 figures on the right of the sign =. In the decimal working 75, but of these 8 are superfluous cyphers, which might be omitted in writing, and which at all events involve no thought or calculation. Rejecting these the number is 67, being a difference of 12 figures only. But on the other hand, in the decimal working, all is plain, straightforward, "simple" multiplication and division, while in the other there is a deal of head work that does not appear on the paper, and some calculation which ought to appear. It is not obvious to intuition how the fractions $-\frac{1}{28}$, $-\frac{8}{28}$, $-\frac{1}{56}$, $\frac{7}{10}$, $\frac{3}{10}$, are obtained; far less, that together they make a halfpenny.

The work would run as follows:—

$$-\tfrac{1}{28}-\tfrac{8}{28}-\tfrac{1}{56}+\tfrac{7}{10}+\tfrac{3}{10}=-\tfrac{18}{56}+1$$
$$=\tfrac{56}{56}-\tfrac{18}{56}=\tfrac{38}{56}=\tfrac{1}{2}\text{ nearly.}$$

Again, how is the 10*d.* in the first line obtained? It arises from the 3 qrs. 9 lbs.

The calculation ought to be set down, but is not. And how is the 4*s.* 6*d.* in the last line got from the £5 7*s.* 11$\frac{3}{10}$*d.*? To divide this sum by 24 is a "compound division" sum, which no man could safely do in his head; the work ought to be set down. Were all this done, the number of figures involving calculation would be greatly increased, to say nothing of the chances of error in the intermediate head work which is still necessary. I should almost be disposed to cite this example as a distinct proof of the superiority of the decimal mode of proceeding, even under the disadvantage of a "Practice" working.

If weights and measures as well as coins were decimalized, the question might be:—Required, the price of 483,597 lbs. at £4·275 per 1,000 lbs., which would be a question of simple Multiplication.

But if only coins were decimalized, then in the pound and mil system we should have 215 tons, 17 cwt. 3 qrs. 9 lbs. at £9·576 per ton, which we should probably work in the following manner:—

100 tons			=	957·600
100 „			=	957·600
10 „			=	95·760
5 „	=	$\frac{1}{2}$	=	47·880
10 cwt.	=	$\frac{1}{10}$	=	4·788
5 „	=	$\frac{1}{2}$	=	2·394
1 „	=	$\frac{1}{5}$	=	·498·5
1 „	=	1	=	·498·5
2 qrs.	=	$\frac{1}{2}$	=	·249·25
1 „	=	$\frac{1}{2}$	=	·124·625
7 lbs.	=	$\frac{1}{4}$	=	·031·115
1 „	=	$\frac{1}{7}$	=	·004·450
1 „	=	$\frac{1}{7}$	=	·004·450
215 tons, 17 cwt. 3 qrs. 9 lbs.			=	2067·433

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Is much or anything gained in this case unless weights and measures as well as coins are decimalised?

29. (1.) Will not the introduction of a Decimal System of Coins and Accounts necessarily tend to render the present system of Weights and Measures very inconvenient, and thus to force the country into the application of the Decimal principle to Weights and Measures for the sake of necessary correspondence with the Coinage?

Answer. (1.) I think it will not tend (otherwise than as a change, viz., temporarily), to produce any inconvenience worth mentioning, by reason of its inconsistency with the Weights and Measures; but I do consider that the sense of that temporary inconvenience, together with the very obvious consideration of the great advantages of a further change in the same direction will have a powerful tendency to persuade (not force) the country to carry out the system to its completion.

(2.) "The concurrent use of non-decimal "division of commodities with a Decimal "Coinage tends, in reckoning prices, to a "result expressed in a binary fraction of "a cent. In such cases, if payment be "made, three fourths of a cent is liqui- "dated with a cent; a half-cent is some- "times paid the same way, sometimes not "noticed. The quarter cent is not liqui- "dated. In accounts the three quarters, "halves, and fourths of a cent are gene- "rally entered, and added in on footing "the columns, the total being carried to "the cents, a fraction above half a cent "being counted as a cent. It is believed "that no sensible loss to either party arises "in the long run from this practice. Even "in a complete Decimal System of "weights, measures, and coins it would "be impossible to liquidate accurately all "reckonings, unless the least coin were "smaller than the public would endure." —Answer to No. 36 of Circular Queries, by J. Ross Snowden, Director of the Mint of the United States.

(2.) These remarks of Mr. Snowden are perfectly just. No system of coinage can run down to the "accurate liquidation of all reckonings." The Decimal System carried down to mils affords a closer approximation to this mathematical precision than the farthing system, as $\frac{1}{1000}$ is a smaller fraction than $\frac{1}{960}$.

30. A great practical authority, Mr. Slater, has stated that one consequence of the introduction of Decimal Coinage will be, that articles will be made up in parcels of ten each, instead of dozens as at present. Will not this be less convenient for subdivision than the present practice of making up articles in dozens?

Answer. Mr. Slater himself has replied in the negative. He says expressly that no practical inconvenience could result from it. But what says common sense? If I want a dozen pair of gloves I go to a shop and buy them. The shopman's business, not mine, is to make the dozen and put them up for me; and the probability is, that the shopman, who has to sell to his next customer a single pair or two, or three, will suffer no inconvenience from having a broken parcel. He must answer the miscellaneous demands of his customers by breaking his parcels, equally, whether they are made up in tens or in dozens. After all, America and France have decimal money. Is it a fact that they make up parcels in tens or dozens? If in dozens, Mr. Slater's conclusion that the tens will drive out the dozens, is falsified; if in tens, it can only be that it is found more convenient to do so, and if so, why should it not be equally found so in England? and where, then, is the disadvantage? Of course, whoever adopts a system adopts its peculiar habits and conveniences.

31. Does not the anticipation of the change in this respect afford a practical illustration of the tendency of a Decimal Coinage to force the country into the adoption of Decimal Weights and Measures?

Answer. If a change be really anticipated it can only be that the country has begun to perceive that there are good reasons for making the change, and they cannot but see that the same reasons apply with still greater weight to a further change; as to force, it remains in the will of the country either to stop short half way or to go on, or not to begin.

32. Is not this an inversion of the natural and proper course? Ought not the country to decide in the first instance what system is most properly applicable to Weights and Measures, and then proceed to adjust Coinage and Accounts to that system, Coins and Accounts being the means for adjusting and registering the Retail payments which arise out of transactions which have had their origin in Weights and Measures?

Answer. The natural and proper course, when great improvements or systems of improvements have to be made, is, to begin with that which is under all the circumstances most readily practicable, provided that it be in itself advantageous, and have no tendency to obstruct further progress by raising up unforeseen obstacles.

The question submitted to the present Commission for examination is, "How far it may be "advisable and practicable to introduce the "principle of decimal division into the Coinage "of the United Kingdom?" not whether it would be more advisable or more practicable to introduce it into the whole system of money, weights, and measures. My individual opinion is, that a Decimal Metrical System would have a much more powerful tendency to bring on a Decimal monetary system as its natural supplement, than the latter the former; but this would not lead me to reject the latter when brought within reach, in hopes of the former—still *in nubibus*.

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33. The Select Committee of Parliament of 1821 recommended that the subdivision of Weights and Measures employed in this country be retained, as being far better adapted to common practical purposes than the Decimal scale. If this recommendation be founded on sound reason, is it not equally applicable to the case of Coinage as it is to Weights and Measures? Is it not fully as true of Coins as it is of Weights and Measures, that the present subdivision of them is well adapted to all common practical purposes?

See Evidence of J. E. Gray, Esq. (Qu. 378.)

Answer. I do not think this recommendation founded on sound reason, nor that the system of coins (any more than of weights and measures) is well adapted to a great many purposes, which are both common and practical, though in the mere matter of liquidating accounts they answer very well.

I have read the evidence of Dr. J. E. De Gray (Qu. 378), and am not impressed by his arguments, nor by the opinions of Mr. De Grave on Weights and Measures; nor by Mr. Bates' remark on the difficulty of obliging people to conform to a Decimal System in their purchases by measure. From Mr. Jessop's statement, that the object of the change being uniformity, you have to compare the uniformity you will lose with that you will gain, one who did not know our system would conclude that there exists a uniformity in our present system which is only true of the uniformity of its use among all classes (and that not in all things). But it is improvement, not uniformity, (as such) that is aimed at for its own sake;—that particular uniformity which carries with it other advantages. If the Decimal System of money were not superior, and vastly so to our present system, I agree with Mr. Gurney (cited by Dr. Gray), that we ought not to make the change; but I look to superiority in other points than mere payment over the counter.—See Answer to Qu. 2.

(2.) Dr. Peacock, speaking of the introduction of the French Metrical System, says, Encycl. Metrop. Art. Arithmetic, p. 448:—

"The decimal subdivision of these measures
" possessed many advantages on the score
" of uniformity, and was calculated to
" simplify in a very extraordinary degree
" the arithmetic of concrete quantities.
" It was attended, however, by the sacri-
" fice of all the practical advantages
" which attend subdivisions by a scale
" admitting of more than one bisection,
" which was the case with those pre-
" viously in use, and it may well be
" doubted whether the loss in this re-
" spect was not more than a compensa-
" tion for every other gain." Must we admit the weight of this authority and the conclusion to which it leads?

(2.) I think not. I am sorry to differ with Dr. Peacock, for whose judgment in most things I have a high respect, but I consider that the loss is trifling and the gain great.

34. Is it not the fact that in all matters of abstract number and multiplication of material things there appears to be a general instinctive tendency to adopt the Decimal System, whilst in dealing with material subdivision, whether in length, capacity, or weight, there is an equally strong tendency to adopt the Binary System, the Decimal System in arithmetical calculation, the Binary System in weights and measures, and the retail transactions of the market arising out of them?

Answer. I am quite unable to say whether there be such an instinctive tendency as is here propounded for the adoption of the Decimal System in multiplying units. As regards the strong tendency to Binary subdivision, it would seem to arise (in so far as it may be supposed to exist), not from any instinct, but from our experience of the facility which some material objects afford for actual bisection. Thus, a given length of string is bisected by doubling the two ends together and straightening out the double string,—a sheet of paper in a similar way, a weight of easily divisible matter by placing part in one scale and part in the other, and adjusting the equilibrium by taking from the heavier and adding to the lighter, &c., while for ternary or quinary subdivision no such facility exists. Another reason for its prevalence is pointed out in Answer to Qu. 47 (2), 53 (2).

However, admitting the instinct, it may be observed in reply that the nature of man is partly instinctive, partly rational, and that the whole history of civilized progress is little else than an account of the steps made towards the subduing and keeping within proper limits the influence of the former, and the cherishing and improvement of the latter. If Decimal multiplication and binary subdivision be instinctive, and if this instinct is to be obeyed as a law of our nature, whatever reason may urge against it, we ought to reject decimal fractions altogether, and to employ the Arabic system of numeration on the left hand of the decimal point, and the Liebnitzian or binary system on the right hand. We are bound, moreover, in all common sense to do this if it would really tend to make our computations easier and our conceptions of their meaning more distinct.

(2.) Are not all the integers of our weights and measures multiplied decimally, but divided by the binary scale?

(2.) On this point let us see what the books of arithmetic tell us. The pound avoirdupois is our unit of weight; it is multiplied by 2×7 (and not by 10) to give the stone; by 28, 56, 112, to give the quarter, half cwt., and cwt. The cwt. is multiplied by 20 to give the ton. Again, the yard, which is our legal unit of length, is multiplied by 11 to give the rod, by 22 to give the chain, by 220 to give the furlong ($2 \times 11 \times 10$), and by 8 times this to give the mile. The gallon, which is our legal unit of capacity, is doubled to make the peck, octupled to make the bushel. In all this it is not easy to trace any dominant instinctive Decimal System of multiplication, but on the contrary a mass of confusion calling loudly for abolition; and the same may be said of our whole system of customary and local (though illegal) multiples. Next, as to the alleged universal

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Binary System of subdivision. The yard is divided into 3 feet, the foot into 12 inches, the ounc into 437½ grains, the rood into 40 poles or perches (there being no square measure of 10 poles, by which the rood could be broken into 4). It is suggested in Question 66 that a harmony subsists between our fractional coins and our system of weights and measures. The above particulars render it difficult to perceive in what that harmony consists.

(3.) Do we not speak of ten yards, a hundred yards, a thousand yards? But when we come to subdivide the yard, do we not think and speak of half a yard, quarter of a yard, &c., and similarly in all other cases?

(3.) This is undeniable, but we also speak of a fathom, a chain, a furlong, and a mile, and we do often speak also of a foot or an inch. There is no absolute indefeasible usage or law of our nature broken through in so doing.

(4.) "The earliest and most venerable of "historical records extant, in perfect co- "incidence with speculative theory, prove "that decimal arithmetic, as founded in "nature, is peculiarly applicable to the "standard units of weights and measures, "but not to their subdivisions or frac- "tional parts, nor to the objects of ad- "measurement or weights." — QUINCY ADAMS's *Report to Senate of United States*, 1821, p. 16.

(4.) Had Mr. Adams cited the particular passages of Scripture to which he appears to refer, it might be possible to discuss *seriatim* their bearings on the question. In relation to the position of the universally instinctive tendency to Binary subdivision, it may, however, be remarked that the Hebrew seah was $\frac{1}{3}$ of the ephah or bath, the hin $\frac{1}{6}$ of the ephah, the omer $\frac{1}{10}$, the cab $\frac{1}{18}$ and the cotyla $\frac{1}{100}$. Again, in weights, the shekel being the original unit, we find the bekah (it is true) half a shekel, but the gerah $\frac{1}{10}$ of the bekah.

35. Is it not then natural and convenient that our integer of money, the £ sterling, should be similarly treated? That whilst we speak of ten pounds, one hundred pounds, one thousand pounds, we should subdivide the £ sterling into half a pound, or 10*s.*; a quarter of a pound, or 5*s.*? And again, that we should subdivide a shilling into half a shilling, or 6*d.*; a quarter of a shilling, or 3*d.*, and so on?— thus applying a Decimal arithmetic to the standard unit of our coinage, the £ sterling, but, not to its subdivisions or fractional parts?

Answer. The premises being denied, or shewn to have no bearing on the subject, or at all events no conclusive weight as argument, the conclusion is inadmissible. See also the last paragraph.

36. In the Report of the Legislative Assembly of Canada on Decimal Currency (p. 14) is the following statement:—

(1.) "The Decimal Currency admits of but "one aliquot division—into halves; but "the New York shilling, an eighth of a "dollar, can be divided into sixths, quar- "ters, thirds, halves, &c., and although "Congress has never coined any shillings, "the American people during sixty years "have clung to their well-worn shillings "and sixpences, perceiving them to be "a great public convenience."

Answer. This clinging to some outstanding portions of an old system, even when the new is admittedly superior, is part and parcel of every considerable change. The reason assigned (if it be more than an inference on the part of the reporting committee) is probably referable to the fact pointed out in the answer to Question 23, viz., the necessity of some payable value below the cent, which is the equivalent of our half-penny. It appears, however, by the new Coinage Law of the United States §§ 2 and 4, that the binary subdivisions of the dollar are called in, and the coinage of the half-cent discontinued, measures which seem contradictory to each other. There may, however, be half-cents enough in circulation for the present to replace the other pieces, each of which did the work of a half-cent.

(2.) "Your Committee are of opinion that "coins representing the eighth and six- "teenth of a dollar, are indispensable "in small transactions in Canada, and "that the smooth British sixpences will "continue to pass extensively as the "eighth of a dollar unless a better "coinage is provided."

(2.) An importation of British farthings would seem to have been the more natural and recommendable provision for the sort of exigency contemplated.

(3.) In a communication from the Rev. Joshua Leavitt of New York (p. 48 of the same Report), this further remark occurs:—

"I have no doubt of the superiority of the "Decimal System for the purposes of "Accounts, and am astonished that other "countries have so long delayed its adop- "tion. Our experience of the benefit of "our federal currency in this respect is all "one way. The saving of time and "labour is prodigious, and the advantage "in point of correctness and of the faci- "lity of detecting errors unquestionable. "But for the purposes of small circula- "tion, in marketing, huckstering, and the "like, I am persuaded that a Duodecimal "Currency like that of England, or like "that which formerly prevailed in the "city of New York, is far preferable. "These small transactions of daily life "outnumber the transactions of commerce

(3.) Mr. Leavitt seems to contemplate as practicable a Decimal System of account-keeping concurrent with an £ *s.* *d.* system of money payment. I do not believe this to be practicable. Any one now may if he please keep his accounts decimally, but he will have a table to consult or a calculation to make at every entry. We must choose between the two courses, and we must balance between those vast and "prodigious" advantages which Mr. Leavitt so justly states, on the one side, and the very much exaggerated amount of inconvenience in the huckstering departments of commerce, which an overwhelming mass of testimony from countries where a Decimal Coinage exists, shows to disappear altogether in practice, or at most to be of infinitesimal importance.

" almost infinitely. And it seems impos-
" sible to make a Decimal Currency as
" convenient in these as the old currency."

(4). " One reason is, that the Decimal Cur-
" rency admits of only one aliquot divi-
" sion, that is, into halves. The shilling
" can be divided into halves, quarters,
" thirds, sixths, and twelfths; and if it
" were needed, a coin of the value of two
" thirds of a shilling would be found
" manageable. In all these countless
" small transactions which I have referred
" to, and in which every man is employed
" many times every day, this capability of
" subdivision is of great convenience. We
" are constantly buying a half of a thing,
" or a quarter, the eighth, the one third,
" and so on. If the price is a dollar, we
" can make the change for one half, for
" one quarter, and if one, two, or more
" pence, with our Decimal Currency; but
" we cannot pay the exact price of one
" third, one sixth, one eighth, one twelfth,
" or any other of the fractional parts. If
" the price is half a dollar, we can only
" pay for one half, one fifth, and one tenth.
" If the price is a quarter of a dollar, we
" can pay for no aliquot division whatever.
" This is a constant inconvenience, and
" can be got along with in no other way
" than by *disregarding small differences.*"

(4.) The convenience in question only exists when the price of the unit is a readily subdivisible one. These cases in the present system are not the majority, nor even a large minority. Under the Decimal System, carried to mils, subdivisible prices would probably be more common than at present.

(5.) If a Decimal Coinage be introduced into this country, is there any reason to suppose that the inconveniences here stated as the result of practical experience in the United States will not equally occur in this country ?

(5.) The inconvenience complained of in the United States in so far as it really existed was no doubt owing to the want at an early period of a coined equivalent to the farthing or mil, so that there is no reason to expect it in this country.

(6.) Will it be possible to obtain the eighth or the sixteenth of a florin, or the quarter of a shilling, or the half of a sixpence, under the proposed Decimal System ?

(6.) Assuredly not.

(7.) If the *small differences*, necessarily arising from this imperfect divisibility of the Decimal Coins, must be *disregarded*, upon whom will the unavoidable loss fall ?

(7.) It will not of necessity be disregarded. The *qualities* of articles differ by shades of gradation, which permit of an indefinitely approximate adjustment of prices; and the retail dealer who fixes the price of small fractional amounts in quantity does, as is abundantly proved in evidence (see Report, 1853 ; Kirkham, Question 1387, 1395; Lindsey, Question 1015; Strugnell, Question 928, 934, 937), make his final adjustment as to the extreme farthing on a variety of considerations, among which quality enters as one, the desire of gain by trifling overcharges, as another; the desire of extending his custom by sacrificing the ultimate outstanding trifle, as another; &c.; some telling one way, some another. In cases where quality is not available for this final adjustment, and where there must be a loss to one or other party, the close dealer takes the advantage and the liberal dealer gives it, and there is no manner of doubt that it tells upon his custom. It is one among the many considerations which gain for one shop the character of a cheap, and for another of a dear one, with those to whom the odd half-farthing is an appretiable fraction of their daily expenditure. Where there is competition, these customers are both able and willing to discriminate. Where there is not, the dealer has the poor customer at his mercy in many ways far more productive of profit, and will very likely affect to despise this small source of gain, to lay it on in the price of the unit tenfold.

(8.) With the tradesman will it not be an accumulating loss consuming his profits; and will it not be impossible therefore for him to bear it ?

(8.) Assuredly not; see answer to (7). He will not suffer it to consume his profits ; he will price his articles (if he give the ultimate fraction) so as to make the fair profits of his trade. If he take it, competition will force him to do the same, and not to exceed them. Besides, a retail dealer who makes his profit by selling an immense number of trifling quantities must keep more shopmen, who must be paid. (Kirkham, Question 1381). It is as much trouble to weigh and put up a quarter of an ounce as a pound. If every transaction be made to pay itself, there is a constant element in every price (the remuneration for the shopman's time and trouble) independent of the variable part proportional to the quantity sold, and which may not improperly be considered as covered, in the long run, by these small fractions when taken: when not taken their total amount merges in the general expenditure of the business.

(9.) Must it not therefore necessarily fall upon the small purchaser ?

(9.) No. See the last Answers.

(10.) The principle of the objection is, that the Decimal System substitutes the divisors 2 and for the 5 divisors 2 3, 4, 8, 12, 16, which are

(10.) The principle of the objection is no doubt very clearly stated here, though in somewhat copious detail ; but it seems only necessary in

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the natural divisors for material things, and are also the divisors of our present money, giving us the third, fourth, and half parts of everything.

That the effect of this will be, in the sale of broken parcels of commodities, a small money remainder, involving loss to shopkeeper or customer.

This, we see, is a source of constant inconvenience in the United States.

Let us take the descending steps from 8*s.*

8*s.*, or 400 mils, or 4 florins, is not divisible by 32, the divisor of $\frac{1}{2}$ oz.

4*s.* or 200 mils, or 2 florins, is not divisible by 16, the divisor of 1 oz.

2*s.*, or 100 mils, or 1 florin, is not divisible by 8, the divisor of 2 oz.

1*s.*, or 50 mils, or $\frac{1}{2}$-florin, is not divisible by 4, the divisor of $\frac{1}{4}$ lb.

6*d.*, or 25 mils, is not divisible by 2, the divisor of $\frac{1}{2}$ lb.

In each of these cases, in the purchase of a broken quantity of material, $\frac{1}{2}$ oz., 1 oz., $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., will there not necessarily arise a broken sum of money, which cannot be paid in any coin; a small "difference which must be disregarded," to the loss of buyer or seller?

reply to reiterate what is said in answer to Nos. (5), (7), (8), (9). As regards the United States, the real inconvenience now felt would rather appear to be the existence in circulation of those eighths and sixteenths of dollars, the continuance of a usage which has been felt to be a nuisance, and which is in process of being got rid of. See Answer to Question 36 (1).

(11.) Mark how under a Decimal Coinage the difficulty occurs in an earlier stage, and in a more serious form, than under the present coinage, precisely as we descend to the lower amounts, to those which are the usual prevalent prices with the middle and lower classes.

(11.) It is precisely in these lower amounts that the trouble and inconvenience to the shopkeeper bear the largest ratio to the value of the article sold, and which therefore justify him in taking, rather than giving, the ultimate unadjusted value, if any, and if his views of the nature of his business taken as a whole lead him to prefer this course.

(12.) If it be assumed that, instead of these prices, "competition will determine prices in Decimals conveniently divisible by 2, 4, 8, or 16," and therefore in prices not corresponding to the Decimal money of Account; if instead of one shilling, or 50 mils, the price of the unit of the material is taken at 48 mils, is not this in itself an admission that in introducing Decimal money we shall have introduced a money not conveniently adapted to the purposes of the market?

(12.) Under any and every system some prices will be divisible and some indivisible, and the latter will always constitute the majority. If divisible prices be really felt to be a great object of public convenience, the mil system affords a more obviously available opportunity for doing it than our present system, and if experience should show that coins of 30, 60, and 120 mils, were really found productive of any material facility, I do not see why they should not be struck, the great object after all being to obtain a system of currency which shall be compatible with a Decimal system of accounts retaining the pound sterling, and not, as our present, in contradiction with it. I, for one, should be quite content to leave it an open question to be decided by experience, what particular system of mil multiples should constitute our coinage, provided our currency were decimalized. But I should give the first trial to the system of 1, 2, 3, 5, 20, 30, 50, 100 mils (with a few 10), reserving the option of enlarging the series by the introduction of those above specified, or any others. That Decimal money, as such, is not found inconvenient for marketing is matter of experience. It is a fact that cannot be argued down.

(13.) And in so doing shall we not have incurred a new set of objections, namely, the inconvenience of being obliged to use several coins with which to pay the 48 mils, instead of one coin with which 50 mils may be paid?

(13.) No point turns on the particular number 48. In the money transactions of a nation all varieties of sums which can be stated in those units which are ordinarily used will come to be paid in the long run. The sums for which there exist single coins will, of course, somehow or other come to be paid in those single coins more frequently than otherwise, but (except for gratuities) I do not believe that the consideration of payment in a single coin determines many prices, certainly not those of articles of general necessity and universal consumption; and provided the coins be forthcoming in reasonable proportion (as to number and value) each to the whole Coinage (see Answer to Question 4), all the conditions of utility are satisfied.

37. Again: Mr. Leavitt bears testimony to the admirable qualities of the Decimal Currency for Accounts, but asserts that for small circulation and payments in marketing, huckstering, and the like, a Duodecimal Coinage is also wanted and preferable to the other. These small transactions of daily life far outnumber the dealings of commerce. And this statement is sanctioned by the concurrence of the Committee of the Legislative Assembly of Canada.

Answer. I cannot imagine the practicability of such a thing with our present system of coins. The only objection I find against them is, that the decimalization of accounts is incompatible with our currency. Otherwise there is no quarrel with them as instruments of exchange; nay, it may be admitted that—if Decimal accounts and Decimal calculation were not an object worth contending for, or even worth submitting to some inconvenience for—the £ *s. d.* system is quite as good as any other at present in use.

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Does not this statement distinctly point to the necessity of not abandoning a Duodecimal System of Coinage, but of introducing, if possible, in connection with our present system of coins, some means by which money transactions may be recorded in a Decimal System of Notation, thus retaining the present system of coins undisturbed, but combining with it a Decimal System of Reckoning or Account keeping?

"Perhaps it may be found by more protracted and multiplied experience that the same material instruments shall be divisible decimally for calculations and accounts; but in any other manner suited to convenience in the shops and markets; that their appropriate legal denominations shall be used for computations, and the trivial (or customary) names for actual weight and mensuration."—QUINCY ADAMS's *Report*, p. .

38. (1.) Are not the following the primary requirements of a good system of coinage? viz.:—

Answer (1.) I consider the primary requirements of a good system of coinage to be—

1st. That it should admit of a system of registration and of computation (thereon founded) in correspondence with and requiring no intermediate calculation to reduce itself to the algorithm by which all civilized nations have at length agreed to represent number in the abstract, so as to reduce the notion of pecuniary value to a combination of the two independent simple conceptions of a pecuniary unit and of abstract number.

2ndly. That all individual coins should represent integer multiples of this unit, and that the multiples used should be such as to render as easy as possible consistently with other objects which may be deemed of superior importance (and they ought to be very important ones), their addition into one sum.

3rdly. That the pecuniary unit chosen should be adapted to the commercial exigencies of the age (taking the word in its largest sense), and should express a value so small that its fractions should, even to very poor persons, be matters of little moment.

4thly. That such a scale of these values should exist in the general system of coinage as to throw as little difficulty as experience shall show to be possible into their mutual aliquot subdivision consistently with facility of addition into one sum.

5thly. That the coinage should consist of such numbers of each sort of coin as shall leave the public under no difficulty in breaking any coin into coins of inferior denominations, and shall enable them easily and readily to pay any given sum.

6thly. That, inasmuch as the scale of abstract number is infinite, and the habitual citation of very large numbers embarrassing; the scale of coinage should be so constructed as that it shall consist of stages, each ascending from the last by one and the same rule of amplification, so that each stage shall afford a magnified unit capable of further amplification upon the same numerical system on the one hand, and diminution on the other; and that wherever the usages of society shall render it necessary, a special name or names shall be imposed on one or more of these new units.

(2.) 1st. That the integer should be divisible into the greatest number of clean fractional parts to correspond with the endless variety of retail transactions which they are to be the means of adjusting:

(2.) I do not consider this to be a primary requirement of a good system of coinage. In fact it seems to involve a contradiction. If the variety of retail transactions be (as it is) endless, no system of clean fractional divisibility can correspond to them. See Report of 1853, Questions 929, 1022, 1023.

(3.) 2nd. That these fractional parts should be expressible in the shortest and most simple form of words, and with the smallest number of figures:

(3.) Here we have an instance of a form of expression or a form of requirement which is so fertile a source of misconception and confusion in political, social, and financial discussions that is ought to be pointed out and proscribed. I call it the "fallacy of the double maximum." It has to be shown in all such cases that the two maxima are not inconsistent with one another. If this can be shown, then the one attained will be found to carry the other along with it. If not, what becomes of one or the other? In the case before us, they are incompatible, the Decimal system involving fewer figures and a shorter form of verbal expression, and the £ *s. d.* system the greater number of aliquot subdivisions.

(4.) 3rd. That the Coins should be such, both in denomination and relative value, as may pass with the greatest facility in valuing or summing them up when presented in great numbers:

(4.) A triple maximum, and again incompatible; amounts expressed decimally being infinitely easier to be summed when presented in great numbers, while the decimal subdivision gives fewer aliquots.

(5.) 4th. That they should be such as may afford the greatest facility for mental conception, for recollection, and for the ordinary processes of arithmetic which the people are daily called upon to perform mentally in the tumult of the market or shop, and without the opportunity of recording them in writing:

(5.) A fourth maximum, and one which may, or may not, be inconsistent with the first, according to personal habits of mental conception and recollection, and the sort of arithmetic to which persons are used, or *to which it is desirable for the sake of civilized progress that they should become used.*

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(6.) 5th. That they should harmonize with the natural tendency of mankind to subdivide commodities for retail purposes by continual halving.

(6.) I cannot admit this among a list of primary requirements. If, consistently with other requisites of infinitely greater moment, it can be secured in any considerable degree, of course it ought. It is easy, however, to call for the coincidence of a number of perfections, but very difficult to unite them. All such things are affairs of compromise; to attain the greater advantage we must school ourselves to disregard the less.

39. (1.) Is not the following a just description of the present system?

In the ultimate subdivision, where the binary division is alone useful, we have two binary steps, viz., two farthings = 1 halfpenny, two halfpence = 1 penny. In rising to the next unit, the shilling, we have again the factor 2 introduced twice, giving four 2*s.* besides the number which, next to 2, is most frequently required as a divisor, viz., 3. In rising to the next unit, the £1, we have again the factor 2 introduced twice, giving six 2*s.* besides the prime number which, next to 2 and 3 and their products, is most frequently required as a divisor, viz., 5.

Thus giving the following table of the factors of the number of each of our present units contained in the superior units :—

Farthing.	2 × 2	2 × 2 × 2 × 2 × 3	2 × 2 × 2 × 2 × 3 × 2 × 2 × 5
	Penny.	2 × 2 3	2 × 2 × 3 × 2 × 2 × 5
		Shilling.	2 × 2 × 5
			Pound.

Answer (1.) Whatever be the demerits of this statement as an argument against the Decimal System, it must be allowed in a pre-eminent degree the merit of ingenuity. It would be perfect as an argument, and would suffice to convince every one of the absolute perfection of the £ *s. d.* system of reckoning if only two things were granted, viz.,—

1st, that the human intellect stands in a definite relation to the scale of its pecuniary transactions, beginning with the meanest capacity, capable only of binary arithmetic, as corresponding to the lowest stage of purchasing power, and proceeding upwards by successive enlargements of idea to that degree of worldly wellbeing which admits the occasional handling of a gold piece; and,

2ndly, that there are no necessities of our nature which require us to take in a larger and more general conception of number; and which feel these narrow restrictions as a series of stumbling blocks interrupting the continuity of progress. It is possible to insist beyond what is fair and reasonable on the advantages the £ *s. d.* system confers, or is supposed to confer, on the very lowest and least educated classes. The middle classes (all between the nobility and the day labourer) also call for consideration. It is especially desirable (looking to the yearly increasing political importance of those classes) that they should have no unnecessary obstacles (see answer to Question 2 (*e*), (*f*), (*g*),) thrown in the way of their educational improvement, and of their acquiring clear and comprehensive views of general commerce and finance.

(2.) Does not this system fulfil to a greater degree than any other possible system some of the above requirements? Can this system be justly considered as accidental or unscientific?

(2.) No doubt it fulfils some of them very well, though as regards aliquots I consider that a division of the £ into 1440 farthings, as being twice divisible by 3 (making the penny consist of 6 farthings) would have possessed advantages over it. I do not believe it to have been purely accidental, though I question whether in the successive stages of its introduction which history describes, any such singularly clear and compact (though I must call them narrow) views can be shewn to have prevailed. Be that as it may, it may very justly, I think, be described as unscientific, if by the word be meant the reasonable adaptation of a system to all the ends it ought to aim at accomplishing, giving precedence to the most important.

(3.) There must have been some valid reason for the adoption and long retention of our present peculiar system of Coins, instead of the obvious plan of making the progression of Coins correspond to the progression of figures according to our Arabic notation.

(3.) When gross ignorance of arithmetic was the rule and not the exception, when money dealings were far fewer than at present, and confined to lower amounts, when the sorts of articles bought and sold were less various and their gradations of quality infinitely less numerous than at present, and when sums of many pounds were hardly ever spoken of among the lower classes, aliquot subdivision was of more comparative importance, and decimal calculation seldom resorted to because few persons had anything to do with dealings of that sort in which the embarrassments of our present system chiefly occur. It will be remembered that it was so late as the century between 1150 and 1250, that the Arabic notation was introduced into Britain; and that the Roman written system of numeration was so cumbersome and unmanageable, that the classification of numbers by pairs, dozens, and scores was almost the only practical one for facilitating computation.

(4.) What is that reason? Is it to be found in the above explanation, and in the varied and infinite divisibility of the Integer obtained through this system?

(4.) See above.

40. Does it not necessarily follow that a System of Coinage based upon a Binary or Duodecimal scale must answer these requirements more completely than a Decimal Coinage, seeing that 12 is divisible by more factors than 10, and that the quotients of such division are again more divisible under the present than under a Decimal system? And does not our present coinage afford peculiar facilities for continued division into clear fractional parts?

Answer. It is not very clear in what respect this question differs from Question 10, to which see the answer. As regards the peculiar facility, &c., see answer to 39 (2.).

41. If in place of our present division of the £ sterling, a decimal division be substituted, shall we not in many cases lose the power of obtaining an exact result?

What is the 3rd, the 6th, the 12th, or the 16th part of a £ sterling under decimal division of the coinage?

Under our present system it is exactly 6*s.* 8*d.*, 3*s.* 4*d.*, 1*s.* 8*d.*, 1*s.* 3*d.*

Again, what is the 3rd, 6th, 12th, and 16th part of a shilling in decimal coinage?

Under our present system it is exactly 4*d.*, 2*d.*, 1*d.*, 3 farthings.

Answer. This question seems to be an iteration of Question 15, to which see the answer.

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42. If it be admitted that for all ordinary retail transactions, for the purposes generally of paying and receiving, our present Coinage is satisfactory, whilst the inconvenience is found to arise when we come to processes of Account-keeping and Calculation, does it not follow that our present Coins ought if possible to be retained without any change, that some decimal system of recording the various sums should be introduced, and that we should decimalize our Accounts, retaining our present coinage in all respects unchanged?—See No. 37.

Answer. If this were practicable without introducing greater inconvenience it would long ere this have been adopted. Any one may, if he please, now record his receipts and payments decimally.

43. How far will this be accomplished by writing down all money values in the number of pence of which they consist, *ex. gr.*:—

£	*s.*	*d.*		Pence.		Mils.
1	0	0	=	240	=	1,000
0	6	8	=	80	=	333·333
0	5	0	=	60	=	250
0	3	4	=	40	=	166·666
0	2	6	=	30	=	125
0	1	3	=	15	=	62·5
1	18	9		465		1,937·499

Answer. 1st. The method proposed ignores farthings, and is applicable of course only to accounts which go no lower than a penny. 2nd, Let us see how a few other entries will look upon this system, and what sort of accounts we should have. Ex.:—

£	*s.*	*d.*		*d.*
3	6	4	=	796
17	2	9	=	4,113
189	7	6	=	45,450
209	16	7	=	50,359

If people counted in pennies, and never used the shilling or the pound, this is of course a complete decimal system. But according to the terms of the question, the parlance is in £ *s.* *d.* and only the entries in pence (for the parlance will follow the currency, since no one would speak of a sovereign as a 240-pence piece, or of a 5*l.* note as one of 1,200*d.*). Now imagine a customer going to a tradesman, to whom he owes 209*l.* 16*s.* 7*d.*, and inquiring the amount of his debt. The tradesman opens his book and finds the above number of pennies set down. Forthwith a calculation has to be made to settle the notes and coins it has to be paid in, besides disputes as to the items. Other cases innumerable of intolerable inconvenience present themselves at once.

(2.) See the following answer to No. 37 of the Circular Queries by J. Ross Snowden, Esq.:—

"*A.* The scope of this inquiry may admit of
" the suggestion, that if the decimalization
" of the British coinage were effected by
" adopting, in place of the pound sterling,
" a new unit of the value of one hundred
" of the present divisions of the pound
" (say 100 farthings, halfpence, or pence)
" all prices and coins under the present
" system would be exactly measured in
" the new unit and its parts, which would
" also be almost exactly commensurable
" with the dollar of the United States.
" A unit of 100 halfpence, for example,
" which might be called a dollar, would
" be equal to $1·013 of the United States,
" an approximation to our unit so close
" that the moneys of the two countries,
" under such a system, might be deemed
" substantially identical."

(2.) On the subject of retaining or abandoning the pound sterling, see the evidence of Messrs. Hankey, Question 135; Airy, Question 294; Herschel, Question 516; De Morgan, Question 728, 729; Bowring, Question 1537, in the Report of the Committee of 1853.

44. Does not every Decimal System of Accounts necessarily consist in taking the lowest Money Unit, and stating in Arabic notation the cumulative amount of that coin contained in any given sum?

Answer. Of course; observing, however, that on the principle of the decimal arithmetic, fractions of the lowest money units, in cases where it is necessary to take account of them, are expressible without any breach of continuity in the system of notation and reckoning.

(1.) In the £ and mil scheme do we not take the farthing (changed in its value and called a mil) as the basis of the system, and then proceed to state all values in the number of these new farthings contained in that value?

(1.) Yes.

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(2.) In the penny scheme do we not take, in a similar manner, the penny as the basis, but without any change in its value?

(2.) Yes.

(3.) In addition to this advantage, will not the statement of values by the number of pence contained in them, rather than by the number of farthings or mils, necessarily involve greater conciseness and simplicity of expression, there being only one fourth the number of pence as compared with the number of farthings in any value?

(3.) If it be considered the accomplishment of any object to throw overboard a large part of it (in point of fact three fourths), of course it may be *so* accomplished with greater facility and with a less extensive mechanism than if the whole work be grappled with.

(4.) Is it not an advantage in any Decimal System that it does not necessarily involve the introduction of a farthing column into all accounts, seeing that all sums under a penny are now voluntarily omitted from a sense of convenience in a very large proportion of accounts?

(4.) It would be extremely easy in the Pound and Mil Scheme to keep accounts to the nearest 5 mils by omitting the terminal figure whenever the exact mils are 0, 1, 2,—adding some small easily made mark, (as ' or +) to the end (still omitting the last figure), if that be 3, 4, 5, 6, or 7, and increasing the last figure but one (omitting the last) by a unit, if the last be 8 or 9. See, for an example, Question 59. But the proposal ignores the small dealer, the little weekly bills (where halfpence and farthings appear in almost every item), and all such small current accounts, and indeed many much more considerable ones. So much stress is laid in the previous questions on the convenience of small dealings over the counter that it is quite unexpected to find a change proposed which, while it equally unsettles all received notions, advantages none but bankers and merchants of the highest class.

(5.) In those cases in which it is found desirable to introduce fractions of the penny, is there not reason to believe, that it will be found more convenient to express those fractions binarily than in a decimal form, seeing that such has been the result of practical experience in the United States?

(5.) See answer to Question 36 (1) (10). To retain the fractions $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, would be to perpetuate one of the most objectionable features of the present system, and to sacrifice the continuity of notation which is the great and essential advantage of the Decimal System. Nothing could be proposed more calculated to bring that system, if adopted in England, into disrepute, than such a partial and garbled adoption.

(6.) The Director of the Mint states (Question 31), "The change has been effectual as "to the use of dollars and cents, but not of "the mil, the fraction of a cent being ex- "pressed binarily."

(6.) The short-sighted view which prevailed in the choice of the American unit, without any original provision of a coin for the lower subdivision into mils, and the necessity of having a payable value at least one step lower than the cent, appear to have perpetuated a vicious usage which is a blemish on their system. We should accept it as a warning, and not as an example.

46. If the penny be taken as the lowest unit of a Decimal System of Accounts, and if all sums be written down in the number of pence of which they consist, will not this afford a Decimal System of Accounts which may be used in conjunction with and without involving any disturbance of our existing system of coinage, or changing the character of the £ sterling as the great unit of account, as the basis of our system of exchange with all the world, and as the great integer by which all our principal calculations and estimates of property and of obligations are made?

Answer. See Answer to Question 43. There is no reason why anybody should not keep his accounts as proposed if he think it preferable. If it should become (which I do not think it ever will), a common practice to name the price of a thing in pennies (say 276,500 pence for a plot of ground) one of two things must happen, either it will have had to be translated out of £ *s.* *d.* into this language by the vendor, and back again, into £ *s.* *d.* by the purchaser before it can be understood what is meant between them, or it will be understood *per se;* in which case what will have become of the pound sterling as the great unit of value?

47. (1.) The fractions of a penny would be written as fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. Is this a disadvantage?

Answer. (1.) I consider it an enormous one. It is no less than a tacit abrogation of the Decimal System. See Answer to Question 45 (5.)

(2.) Is it not the case, that practically in all countries, even in those in which the Decimal System is most completely carried out, the ultimate subdivision of coins is binary?

(2.) The ultimate subdivision of the coin, or indeed of anything divisible which can be given in exchange for any other, may be binary on the principle of "splitting the difference;" but it is one thing to pay a half-cent and another to set it down in an account book as $\frac{1}{2}$ c. instead of 0·5. The former is attended with no inconvenience, the latter with all those which attend a systematic violation of system.

(3.) Is not this shown by the fact that in France, Portugal, &c., the 5-centime piece and the 5-rei piece are the lowest coins in general use or generally expressed in accounts?

(3.) What may be the usage in Portugal I know not; but in all the bills which I have paid in France, so far as I can remember, I have found this lowest coin set down with the figure 5, and never under the fractional form $\frac{1}{2}$, of course excepting where the franc has been broken into sous, in which case it appears as an odd sou and not as the half of anything. Such a thing now, however, hardly ever occurs.

(4.) In the United States is not a half-cent universally expressed instead of 5 mils?

(4.) See answer to Question 45 (6.)

(5.) What is the inconvenience of writing such values as fractions? Are they not as easily added in this as in a decimal form, and are they not more easily multiplied?

(5.) The inconvenience is great. There are more marks to make with the pen, they need small and often illegible figures in printing. Few people write them neatly, nor all alike, some thus: $\frac{1}{2}$, or $^1/_2$; some write qrs., some do not keep them in line, and very few write them evenly. But

these are trifles compared to the inconvenience they have as utterly opposed to the decimal idea the object of which is to establish a continuity of notation between the integer and its parts. They are not quite so easily multiplied in some cases as in a decimal form (*e. g.* $9 \times \frac{3}{4}$), and the addition is easy only in the rare instances where the fractions are very legibly written or printed.

48. This system would not include fractions of the penny. Is it desirable to incur the inconveniences of the £ and mil scheme, the abolition of our present copper coinage, the abandonment especially of the penny, &c., for the purpose of comprehending in a Decimal System of notation and account keeping the fractions of a penny, which under the present system are so seldom required, which, when required, can be so easily expressed as fractions, and which are in so many cases voluntarily omitted for the sake of convenience?

Answer. The fractions of a penny are not seldom required. And it is not solely or principally to comprehend these in a Decimal System of notation and account keeping that the £ and mil scheme is desired, but to enable the Decimal Principle to be carried on into calculations where the unit *must* be considered as indefinitely subdivisible. After all, if there is to be a decimal coinage, surely one would not coin florins, cents, half-cents, and quarter and eighths of cents, instead of halfpence and farthings in mil value. This would be to fall into the American error without the same excuse for it, and in a more exaggerated form.

49. (1.) If the Decimal System is to be tried for the sake of simplicity and convenience in account keeping and calculation, is it not the most prudent and safe course to make a trial of it, in the first instance at least, of a system of account only, without disturbing the coinage?

(2.) How far would this be accomplished by simply authorizing the expression of all sums of money in the number of pence of which they consist?

Answer. (1.) To use it as a system of account without coins to correspond, if voluntary, would ensure its rejection. People will not translate their receipts and payments into another language before they enter them up in their books. If compulsory it would be received with a storm of indignation as a needless and most galling hardship. It might certainly be used, however, in stating the public accounts.

(2.) It would not be accomplished at all. See answer to Question 43 (1.) and 45 (3.).

50. If the Decimal System of coinage recommended by the Committee of the House of Commons (£ and mil scheme) be adopted, will it not necessarily involve the introduction of more than two monies of account?

Will not this necessarily give rise to difficulty, trouble, and confusion?

Answer. We should have one "money of account" if we reckoned in mils only, or in cents only, or in florins only, or in pounds only; two if we chose to use two denominations, three if three, and four if all. There would almost instantly arise a usage admitting of no ambiguity. The calling over a book of accounts would probably be done by naming the pounds as such, and the rest by naming the figures; thus 19·803 would be read "19*l.* eight, nought, three." I cannot perceive any possible inconvenience. Values must have denominations, and the figures, of which a sum decimally expressed consists, must have special names to indicate to what order or column they belong.

51. Is there any country in which more than two monies of account are now in practical use?

Answer. See answer to Question 53.

52. Is it not important, with a view to the simplicity and facility in calculation which are supposed to constitute the great recommendation of a Decimal System of coinage, that there be not more than one hundred steps between the highest and lowest monies of account?

Answer. If it were a fact that the larger unit of value in this country were not more than one hundred times the smallest value which the business of life requires to pass in payment, it would be needless complication to make more than 100 steps from the highest to the lowest, whether coin or money of account. But we find 960 such steps, and they must be represented. It is, moreover, a less change to enlarge them to 1,000 than to contract them to 100. Nor is it easy to perceive any vast difference in respect of simplicity and facility of calculation (other than the advantage of a continuous system on the decimal side.)

[I have read Dr. Gray's reply to Question 385 (Preliminary Report), and I confess myself not impressed with the same view. Beef is not always exactly 8*d.* a pound, nor is sugar always exactly 4*d.*; each system would have its cases of ease.]

53. Is not this the case in all the principal decimal coinages now in use, *ex. gr.*, franc and centime in France, dollar and cent in the United States, &c.?

(1.) By an Act of Congress passed in the year 1792, it was ordained that "the money of "account of the United States shall be ex- "pressed in dollars or units, dimes or tenths, "cents or hundredths, and mils or thou- "sandths."

(2.) Notwithstanding this long-existing state of the law, we are now told, upon the authority of the Director of the Mint, that in that country they "have but two denominations of "Money of Account,—the dollar and cent." And further, we are told "that below the cent "they do not usually reckon in mils or

Answer. (1.) Taking this explanation of what is meant by "money of account," *i. e.*, the denominations in which accounts are directed by law to be kept, whatever be the coinage; I am not aware that in England we have any "money of account" at all. Certain denominations are legal, but they are the names of coins; and the "good and lawful money" in which payments are enforceable, refers to coin of the realm or its legal equivalent in notes. It appears from the Act of Congress cited, however, that the United States have in fact four "monies of account" (see Qu. 51), but that usage has ejected two of them—or rather—(2) that owing to the fundamental error committed in the choice of their unit, which necessitated the use of some mode of paying a less value than a whole cent, while the mil

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"decimals, but in binary fractions of a cent," that is, in vulgar fractions.

being only the fifth part of a farthing, was too small a value to circulate and keep up the recollection of that denomination by its visible existence; the principle of "splitting the difference" by a half-cent, and perhaps the calling it a half-cent when coined by that name instead of 5 mils, drove that money of account out of use. The "dime" was disused as a name, because being only 5*d.* in value, it did not want a special name; but with or without a name it figures as a money of account, *i. e.*, as the denomination of the figure to the left of the unit in writing a sum, such as 73 in columns,

c.	$	*d.*	*c.*
	0	7	3.

(3.) What inferences are to be drawn from these facts?

(3.) The inferences to be drawn from these facts appear to me to be, that the American unit is ill chosen, and should have been either only half or else five times what it is—that the French unit produces no inconvenience, and that the proposed English mil would work in all probability satisfactorily, and remain a money of account.

(4.) Do they indicate that, be the law what it may, in Decimal Coinage more than two Monies of Account, and more than one hundred steps between the highest and the lowest unit, are found to be practically inconvenient, and, in truth, unworkable.

(4.) In my opinion, no.

(5.) And further, that the broken parts of a low unit, such as the cent in the United States and the penny in this country, are more conveniently represented by Vulgar Fractions than by Decimal notation.

(5.) I think not. See answer to Qu. 46 (5).

(6.) Upon what other supposition can this established departure in practice from the millesimal division of the dollar distinctly laid down by the law be accounted for?

(6.) See Answer to (2) of this general query.

(7.) The annexed statement deserves attention; it appeared in "The Times," April 4:—

"New Orleans, March 19.

"Cotton.—Sales to-day, 3,500 bales, at an "advance of $\frac{1}{8}$c., the market closing firm. "New Orleans, middling, 13$\frac{1}{8}$c. to 13$\frac{1}{4}$c.

"Sugar has advanced $\frac{1}{8}$c. and sells for 10$\frac{1}{8}$c., to 10$\frac{1}{4}$c.

"Breadstuffs quiet. Pork firm. Lard ad-"vanced $\frac{1}{4}$c.; kegs, 14$\frac{3}{4}$c.

"Freights.—Cotton to Liverpool, 0$\frac{2}{3}$d., and "to Havre, $\frac{7}{8}$c."

The broken parts of the cent are all stated in vulgar fractions, in opposition to the law already quoted.

These fractions, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{2}{3}$, $\frac{7}{8}$, can none of them be stated accurately in tenths of a cent.

(7.) The very prevalent commercial practice of quoting shades of price-variation in 8ths of the generally adopted unit, however that unit be locally divided, is, as it appears from this and similar quotations, employed "on change" in the United States. Our stockbrokers do likewise where the unit is the pound sterling. That such a practice would prevail among brokers who have not the close-dealing interest of their principals is very natural. Agreed as to the unit—they agree to "split the difference" and then (the half being acknowledged as a market price) another splitting of the difference generates the quarter, and so on. The practice is no doubt fostered and preserved in use from habit, and from the tendency of our own brokers, and is certainly an inconvenient one and a remnant of commercial barbarism. Take the price of stocks for instance: to buy £1,397 17*s.* 9*d.* consols, to find the effect of the odd 8th per cent. We have a division sum to execute, viz., to divide £1,397 17*s.* 9*d.* by 800, whereas, were the shade of price one tenth, the work would stand thus: £1·398 to the nearest mil, were a Decimal System in use.

(8.) In the case of a rise of $\frac{1}{8}$ cent in cotton, this, stated decimally, must be given as a rise of ·1 mil or ·2 mils. There is, however, a small difference; the first is too little, the second is too much. What must be the effect of this unavoidable difference, small per lb., when multiplied into the number of lbs. contained in 3,500 bales of cotton? What is the lesson to be derived from those considerations?

(8.) The inquiry, what would be the effect of $\frac{1}{8} - \frac{1}{10}$ of a unit is absolutely of no moment as regards the question at issue. One or the other habit of quotation being established the other is excluded, and no commercial question could possibly arise about this odd 40th. The only point of any consequence is, which practice (supposing a Decimal currency) gives least trouble in calculation. Which is easier, to divide 3500 by 800 or by 1,000? The latter is performed by merely putting a dot between the 3 and the 500. Which is most readily calculated, £17253 consols at $\frac{3}{8}$ or $\frac{3}{10}$ on a Decimal System of Coinage? There is little doubt that were such a system adopted in England, we should have meetings of committees from the Stock Exchange, Chambers of Commerce, etc., and conferences with American committees, to agree to abolish the system of 8ths, and adopt the 10ths.

54. If with us the £ sterling be retained as the principal Money of Account, does not a subdivision into one thousand parts become unavoidable, with the addition of intermediate Monies of Account between the £ and the mil?

Answer. Yes; only that I should not call it an addition of Monies of Account. We now use the words pounds, shillings, pence, and farthings, and it seems no additional inconvenience (if any at all) to use instead the words pounds, florins, cents, and mills. We now write (awkwardly enough to be sure) £3 16*s.* 6$\frac{1}{4}$*d.*, or 1 qr., while, on the other system, we should have only to write £3·826. The "monies of account" must be written and spoken of in either system in some form or other. Some might prefer to write it £3·82·6 or £3·82,6, or £3·82 + if he liked better to keep his account to the nearest penny, but these are rather conveniences than the reverse.

55. Will not this constitute an important difference between the Decimal Coinage of this country and the Decimal Coinages now in use in other countries, much to the disadvantage of our Decimal System as regards simplicity and

Answer. I cannot perceive where the disadvantage lies. As compared with the United States currency the advantage would be all on the side of the British mil system. See Qu. 53.

convenience of calculation, and especially of mental as distinguished from written calculation, which the middle and lower orders are constantly called upon to perform in their daily transactions ?

56. (1.) Under our present system is not the high value of our Integer, the £ sterling, a source of great convenience and advantage, especially as compared with the lower value of the franc in France and the dollar in America,—

(2.) First, as facilitating the conception in the mind of large values, and expression of them in fewer figures and with fewer words ;

(3.) Second, as admitting of a greater multiplicity of clean fractional divisions ?

Answer. (1), (2), (3). The high value of our integer £1, is advantageous as a unit compared with the dollar, inasmuch as it admits of a really available division into 1,000 mils, giving the mil a visible and tangible existence, which the dollar does not. It has some (though a very trifling) advantage over the French franc in respect of the consideration, (2.) *i. e.*, in our eyes, though in France, where individual fortune and expenditure are not so large as in England, the franc is a better unit. There is no advantage in multiplying the clean fractional subdivisions of a unit already small enough not to need much subdivision. Were the franc divided into 960 parts, only the larger fractional subdivisions would ever be used. As to the advantages of "clean fractional subdivision" generally, I consider them exaggerated, in the prominence in which they are placed in these questions ; at the same time not denying it to have some, and those by no means unimportant.

57. By the adoption of the Decimal system, will not this advantage be converted into a great inconvenience ?

Will not our high Integer, by necessitating the intervention of one thousand steps between the top and the bottom of the scale, instead of one hundred steps as in other countries, become the source of confusion and inconvenience, and render the adoption of the Decimal Scale in its most advantageous form impossible with us ?

Answer. Quite the contrary. I consider that it will put us in possession of the Decimal System in its most advantageous form. 1st, It will save us from a breach of continuity in our notation of the ultimate payable value. (See answer to Question 36 (4) and 48.) 2dly, It will tend in small dealings to bring the odd farthings into view, and to call attention to the nice shades of retail value by which changes of wholesale price are followed out with the least disadvantage to the small consumer. (Answer to Question 6, (3), (4).) 3dly, It will give a homogeneity to all statements of money value down to the *minimum numerabile*, and thus bring out into evidence a most extensive range of aliquot subdivisibilties available for retail transactions, which are masked and overlaid by the £ *s. d.* system. (Answer to Question 15.) 4thly, It will show at once at a mere inspection of the figures the exact divisibility, or the reverse, of every sum that can be paid, down to the ultimate farthing, by 2, by 3, by 4, by 5, by 6, by 8, by 9, by 10, and by 11. (See Answer to Question 8 (2.).)

58. And further, will there not necessarily be a less number of clean fractional parts under a system which resolves the £ sterling into one thousand mils, than under the present system, by which it is resolved into 960 farthings, inasmuch as 1,000 admits only of fifteen divisions without a remainder, whilst 960 admits of twenty-seven divisions without a remainder ; and the results thus produced are again susceptible of division under the present system, but will not be so under the Decimal system ; *ex. gr.*, the eighth part of 960 is 120, which is again divisible by 2, 4, &c. without remainder ; but the eighth part of 1,000 is 125, which is not susceptible of further division by 2, 4, &c. without remainder ?

Answer. This question seems to be an iteration of Question 15, the answer to which see. See also as respects 120, the answer to Question 36 (12).

59. In Commercial, Trading, and Banking accounts all sums less than a penny are now omitted from considerations of convenience and saving of time in account-keeping. But under a Decimal system, which divides the £ integer into mils, the fourth or mil column must in all cases be retained, as the omission of it would involve the omission of all sums up to $2\frac{2}{5}d.$ The effect of this will be an increase of 10 per cent. in the number of figures used in all such accounts. Will not this increase in the number of figures used in such accounts interfere with the brevity and simplicity of expression, and the saving of time in account-keeping which are anticipated from the Decimal system ?

Answer. The example here set down will show that it is perfectly practicable to keep an account to the nearest 5 mils (see answer to Question 45 (4)), which is the nearest corresponding prime element of the Decimal System to the penny in the present. As regards the 10 per cent. increase in the number of figures mentioned in the Question, it would appear to be founded on some such estimate as Mr. Minasi's concerning which see Note on answer to Question 2 (5).

A.			B.			C.		
£	*f.c.*	*m.*	£	*f.c.*	*m.*	£	*f.c.*	*m.*
17	25	0	17	25		17	25	
8	37	1	8	37		8	37	
1	28	2	1	28		1	28	
376	79	3	376	79	.	376	79	5
	2	4		2	.		2	5
1	10	5	1	10	.	1	10	5
16	7	6	16	7	.	16	7	5
111	93	7	111	93	.	111	93	5
21	47	8	21	48		21	48	
	6	9		7			7	
554	38	5	554	38	.	554	38	5

The column on the right hand for the dots, 5's, or other marks, (which need only be counted up in pairs, not summed as figures,) need only be very narrow, occupying quite a trifle of room in an account-book. As regards the increase of trouble in account-keeping, therefore, the advantages anticipated (on which the testimony is almost unanimous) will not be interfered with to any sensible extent.

Sir J. F. W. Herschel, Bart.

60. The Decimal scheme now under our consideration will retain the shilling and sixpence as fractional Coins, but will it not destroy the peculiar advantage which now attends them, namely, their convenient divisibility? A shilling resolved into 50 mils is divisible only by 2, 5, 10, and 25; but the same shilling, resolved by our present system into 48 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, and 24.

Answer. A shilling is divisible into 50 parts under the Decimal System, into 48 under the present. And there will be coins to render the division practicable. Of course, if aliquot divisibility be the only divisibility that is regarded, there is nothing further to be said, the conclusion is against the Decimal System. But this does not appear to me a just view of the matter.

61. (1.) Is it not a serious objection to the proposed scheme that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of every thing which they require, and to the use of which they are well accustomed; whilst, on the other hand, it will give them the divisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use?

Answer. (1.) Any man poor or rich can purchase either a third or fourth part of anything divisible which he is able to pay for, and the shopkeeper will tell him the price of it to the nearest farthing or mil. After all, whoever wants to buy a thing must ask the price of it. If a rich person goes to buy a pound of cinnamon, he does not ask the price per cwt., and if a poor one goes to buy an ounce of tea why should he not ask the price per ounce? Calculate as he will, he cannot get it a mil cheaper than the shop price, but if he think it dear for the quality, he may go to another shop. Neither are these divisors at all likely to be thrown out of use. There will be plenty of commodities sold at easily divisible mil prices.

(2.) " A glance of the eye is sufficient to " divide material substances into succes- " sive halves, fourths, eighths, and six- " teenths. A slight attention will give " thirds, sixths, and twelfths. But divi- " sions of fifth and tenth parts are among the " most difficult that can be performed with- " out the aid of calculation. Among all its " conveniences the decimal division has " the great disadvantage of being itself " divisible only by the numbers two and " five. The duodecimal division, divisible " by two, three, four, and six, would offer " so many advantages over it, that while " the French theory was in contemplation, " the question was discussed, whether " the reformation of weights and mea- " sures should not be extended to the " system of arithmetic itself, and whether " the number 12 should not be substi- " tuted for 10 as the term of the periodical " return to the unit."—Quincy Adams's *Report*, p. 71.

(2.) It appears from this quotation that the question was discussed whether or not to adopt a duodecimal arithmetic in France, and that the proposal was rejected; which, at least, proves that the originators of the new system knew how to draw a line between a wild and purely visionary proposition, and a rational and advantageous one. Material substances are practically divided into halves and thirds by artificial processes, surer than those natural ones suggested by Mr. Adams, nor does it appear what connection the more or less easy division of material substances can possibly have with the payment of coins or the calculation of prices.

62. The proposed scheme involves an absolute change in the value of all the lower coins. The penny and all multiples of the penny other than six and twelve will not be interchangeable at equivalent values with the new Decimal Coins; and again, the two lowest monies of account in the Decimal System, cents and mils, will be uninterchangeable at equivalent value with any of the present copper coins, although these latter form parts in odd pence of a large proportion of existing contracts, especially amongst the lower classes, and constitute an immense proportion of the existing coinage.

From this cause it is anticipated by some persons that confusion and difficulty in their accounts, some unavoidable loss and injustice, and a vague but dangerous impression of more extensive injustice will arise amongst the mass of the people.

Whereas a decimal scheme founded upon the penny or the halfpenny would involve no real change in the value of any of our coins, but would only involve some additional trouble to the richer classes by giving a new numerical form to their high integer, the £ sterling, but not involving any absolute change in its value.

Do you think these apprehensions well founded, and what is your opinion of the extent and importance of this difficulty?

Answer. With due notice given and the proper steps taken for preparing the public mind for the change, and perhaps also with a concurrent circulation of the new coins with the old for a time, and the gradual withdrawal of the old, I should hardly expect that any but the very lowest and most ignorant persons (and those unduly excited for purposes of mischief) would receive the impression of injustice being done or intended. A certain amount of difficulty and confusion must be expected, and in some few cases where unprincipled parties have to do with ignorant ones, possibly some losses and hardships, to the extent of a few odd pence or halfpence. Also just at first mistakes would be made. I am far from underrating the importance of such difficulties, or the probability of evil-disposed persons making a handle of them to excite tumult. But of the extent to which they may be expected to prevail, I do not consider myself a competent judge. As regards the halfpenny system, it would, I think, puzzle all parties and be well received by none.

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher classes,—those who keep extensive

Answer. Questions 63, 64, 65. These Questions appear to contain a kind of summary of the arguments specially insisted on in the previous

accounts, and enter into large calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multiples and subdivisions?

64. In connexion with the foregoing considerations, it has been suggested that a vast majority of the smaller money transactions in a community are not transactions of written account at all; that they arise out of retail purchases made in the market or the shop, the calculations connected with which are necessarily performed in the head, and are not reduced to writing. That for these purposes, namely, adaptation to the existing division of our weights and measures, for distinctness of mental conception and facility of calculation in the head, our existing coinage is better adapted than a Decimal Coinage; whilst the supposed superiority of a Decimal Coinage for purposes of written accounts and calculations is not applicable to such transactions, and would not prove beneficial to the great mass of the people with whom such transactions are of constant daily occurrence.

How far do these considerations constitute a just ground of objection to the introduction of a Decimal Coinage? or what reply can be made to them?

65. Looking to the considerations alluded to in the preceding questions, the superior facility of division possessed by 12, the further very convenient and almost unlimited facility of division arising from our peculiar mode of reckoning the £ integer into shillings, pence, and farthings; the harmony which exists between our fractional coins and our weights and measures, the doubtful advantages in facility of calculation to be obtained from Decimal Coins unaccompanied by decimal weights and measures, and the brevity and convenience of expression, oral and written, which attaches to our present coins;—duly weighing, on the other hand, the advantage of assimilating the progression of coins to that of figures, the simplicity and facility in keeping Accounts and making calculations, the saving of time in education and of labour by the substitution of simple for the proverbial inconvenience of compound arithmetic, which it is expected will arise from the introduction of Decimal Coinage:—

I submit these questions to the consideration of my colleagues, with great diffidence as regards their incompleteness, and the mistakes which, I doubt not, will be found to be involved in them; but, at the same time, with a full assurance that they are calculated to promote that "further sifting in public opinion" which both the Chancellor of the Exchequer (Mr. Gladstone) and the President of the Board of Trade (Mr. Cardwell) alluded to in their remarks, quoted in our Preliminary Report, as necessary to "secure a right understanding of the subject by the public, without which it would not be safe for the Government to take any steps in regard to it."

The advantages of our present system of Coinage, the difficulties necessarily involved in a change, and the objections which may be reasonably urged to each separate system of Decimal Coinage, constitute a branch of the subject which has not perhaps been sufficiently regarded in preceding investigations. Hence these Questions, the object of which is to draw attention to considerations which must be thoroughly sifted and weighed before the subject can be correctly understood by the public, or a decision be safely taken by the Government.

OVERSTONE.

April 1857.

Sir J. F. W. Herschel, Bart.

ones, and from the paragraphs finally subjoined to the whole series, to be rather addressed by the noble proposer to his colleagues of the Royal Commission, as comprising such a summary. In submitting, therefore, for consideration the above replies to the previous inquiries, seriatim, I feel that I have done all that I can properly do without stepping out of my province.

J. F. W. HERSCHEL.

Collingwood,
June 15, 1857.

J. R. McCulloch, Esq.

(*Communicated by Lord Overstone.*)

Letter from J. R. McCULLOCH, Esq. to Lord Overstone.

My dear Lord, Stationery Office, April 4, 1857.

I have looked carefully over the queries in regard to the Decimal Coinage which you were so good as to leave with me, and they appear to be so complete and exhaustive that I really have nothing to add to them. In truth, this is a matter to which I have never paid much attention, and in regard to which I am but slenderly informed. I have been in the habit of considering coins as being intended to fulfil two great objects, viz., to serve as standards of value, and as instruments by which to facilitate the interchange of commodities. As respects the former function the designation of the coin signifies little, the grand consideration being that its weight and purity should be maintained invariable; and that if substitutes be used in its stead they should be immediately convertible into the standard. In their second function, or as instruments for facilitating the interchange of commodities, I have always thought that our present coins were far more serviceable than coins issued on the Decimal principle. But you have shown this so very conclusively in your queries that I do not know that anything more needs be said on the subject. The only advantage of using coins issued on the Decimal System instead of those now in circulation, would be found, if it be found at all, in the greater facility of keeping books and accounts. But a greater good is not to be sacrificed to a less. And I will venture to say, that for every transaction in which a Decimal Coinage would be of advantage, there are at least from ten to twenty or more in which the present system is decidedly preferable. The retail transactions of the country, settled by the intervention of shillings, pence, and farthings, are incomparably more numerous than those that involve the use of pounds. And as the subdivisions of the pound in our present coinage are more various and more commodious than they would be under the Decimal System, and as everybody, even those who can neither read nor write, is familiar with their use, I cannot help thinking that to change them would be an act of gratuitous folly.

The introduction of the Decimal System in France was part and parcel of that gigantic revolution that overturned everything that was established in the country. But even in France its adoption has been attended with the greatest difficulty, and it cannot yet be said to be fully accomplished. Many parts of the system have had to be abandoned; and no one familiar with French money will pretend to say that it is so well suited for retail transactions, that is, for the real business of the country, as ours.

I have no idea, supposing an effort were really made to introduce the Decimal System, with its florins, mills, and so forth, that it will succeed without a vast deal of trouble. The present system is associated with our earliest recollections, with all that we have practised, and with all of which we have heard, and about which we have read. Were the new system decidedly better suited to the end in view, that is, to enable small transactions to be more readily and easily settled than the existing system, it might be eventually introduced, though with a good deal of difficulty. But when it would be the reverse of this, when it introduces a new set of outlandish terms, and when it makes the settlement of small transactions much less easy, I should doubt whether its general adoption would be possible,—and if possible nothing would be gained by it. This, therefore, seems to me to be a case in which we had better act on the common-sense principle of letting well alone. At all events, before we disturb what is well, we should have something better in view, which is not the case in this instance.

Such merchants, bankers, &c. as wish to keep their books on the Decimal principle may do so at this moment with nearly as much facility as they would do were a Decimal Coinage in existence. Suppose a merchant had to enter a sum of 1*l.* 15*s.* 9¾*d.* in his books, and that he wished to use decimals, he would write 1·7906, or, if he wished for extreme accuracy, 1·790625. And this he might do very easily by having a table affixed to his desk containing the decimals of all the fractions of a pound, and conversely. It would be seldom that a clerk would have to look into this table, as he would soon come to remember the decimals for all the principal parts of the pound, and when he had occasion to look at it he would find the equivalent at a glance.

Seeing, therefore, that our present coins serve incomparably better than coins issued on a Decimal System, for at least ten out of eleven of all the transactions in the country settled by the intervention of coins,—and seeing, also, that the advantage, such as it is, of keeping books and accounts on the Decimal System may be readily secured with our present coins,—I conclude that it would be most unwise, or as I have already expressed it, that it would be an act of gratuitous folly, to disturb our existing coinage system.

Trusting to your goodness to excuse this lengthened epistle,

I am, &c.

The Right Hon. Lord Overstone, &c. &c. &c.

(Signed) J. R. McCULLOCH.

(*Communicated by Lord Monteagle.*)

Professor Miller.

W. H. MILLER, Professor of Mineralogy in the University of Cambridge.

Answer to Question 1. Decidedly.

2. The inconvenience of performing the most simple arithmetical operations, such as adding, subtracting, multiplying, and dividing by even low numbers, as compared with the trouble of performing the same operations with a Decimal Coinage, on account of the odious division by twelve in passing from pence to shillings, and by twenty in passing from shillings to pounds, and also on account of the complication and liability to error of the present system in accounts.

Professor Miller.

3. I consider the present system inconvenient for the purposes of retail transactions. My objection is not by any means restricted to the inconvenience of our present coinage for the purposes of account-keeping and calculation.

4. In an imperfectly civilized country, having but little trade, the primary purpose of coins is for adjusting retail payments. In this country the two purposes cannot be separated.

5. With us one of these purposes cannot be made subordinate to the other.

6. I cannot allow that the merit of a coinage depends solely on its fitness for small payments, independently of its use in accounts; yet, assuming the merit of a system of coinage to be decided by its fitness for small payments, a Decimal Coinage would have a great advantage over our present system in finding the price of three or four articles bought at once; also, in giving change.

The substitution of a Decimal Coinage for our present system would promote the convenience of the most humble buyers and sellers in the long run, quite as much as—probably more than—that of the affluent and educated classes.

7. Yes.

8. I see no advantage in breaking the integer into a large number of clear fractional parts.

I do not consider this an objection to the Decimal System.

9. Mere assertion,—so often repeated, that, with the usual effect of such repetition, many people are more than half persuaded to believe it true.

These considerations have no validity as objections to a Decimal System of coinage. The fallacy consists in attributing to the decimal division the inconvenience due to the badly-selected names, 'decimètre, centimètre, millimètre,' or 'kilogramme, hectogramme, decagramme, decigramme, centigramme, milligramme,' which must ever remain a stumblingblock to the people.

The evil of such names caused in Holland the substitution of the following:—'pond,' 'ons,' 'lood,' 'wigtje,' 'korrel;' and in the Lombardo-Venetian kingdom of 'Libbra nuova,' 'oncia,' 'grosso,' 'denaro,' 'grano,' for kilogramme, hectogramme, decagramme, gramme, decigramme.

10. This fractional divisibility is not wanted, so long as the smallest coin is small enough, and not too small. The proposed mil answers this condition extremely well.

11. No; the mind regards the $\frac{1}{10}$th, or $\frac{1}{100}$th, or $\frac{1}{1000}$th as unit, and then deals with any number of them as integers; but, so long as they retain the badly-chosen names, they lose much of their utility.

12. These examples are not fair. The fact that the penny contains four mils is suppressed The example to be fair, should have stood thus:—

s.	*d.*	far.		*s.*	*d.*
7	6	3	or	7	$6\frac{3}{4}$
2	6	2	„	2	$6\frac{1}{2}$
1	3	0	„	1	3
0	9	3	„	0	$9\frac{3}{4}$

7*s.* 6*d.* 3 farthings.
2*s.* 6*d.* 1 farthing.

The prices are assumed so as to be convenient in our present system. In London I often see things marked with such prices as 9*s.* 11*d.* 3 farthings per pound or yard. The prices might have been 5 cents, 7 cents, 12 cents, just as well.

30 pence is a very convenient amount for the performance of this operation, and so would 30 mils be.

I presume the buyer of 1lb. of these candles would have to pay 1*s.*, and consequently the computation of the cost by the annexed rule would be of but small practical use.

The convenient sum of 30 pence again used, suppose it had been 1*s.* 5*d.*

These examples may possibly be found in some curious old book of arithmetic. But do they occur in the market and in the huxter's shop?

A selected case. How many coins will be required to pay 100 mils?

A selected case. How many coins will be required to pay 20 mils?

13. This is the same as objections 8, 9, 10, 11, 12, and the answer to it the same

a. Mere assertion. Erroneous.

The old Scandinavian arithmetic proceeded by twelves, that of the Phœnicians and Celts by twenties. Hence the frequent reckoning by dozens among ourselves, by the gross in Germany and England. The German schock or 3 score, and the six score in use in England for many purposes.

14. Not fair; farthings should be added. But leaving this unfairness out of the question for the present, in section 6, the shilling column on an average of accounts, would have had five cases of two figures instead of only two. For the pence column there would be two cases very nearly of two figures. Therefore, in fairness, the number of figures would have been 31.

If we introduce the farthing in order to make the accuracy in the three columns equal, or nearly so, we shall have to introduce 0 in three cases, and 3* marks in each of the remaining seven cases; i. e., we must add 24 marks. The total number of marks in each case would then be 55, 34, 52 respectively.

It would be just as easy to take as an example such a number of mils as might be divisible by 3, 4, 6, and 12.

15. How often are such divisions required? Objections 8, 9, and 10 over again.

16. Yes.

17. Yes; because it happens but rarely that the price of 1lb. or 1 yard of any article is exactly 1*l.*, or 1 florin, or 1 cent, or 1 mil.

* Every fraction, such as $\frac{1}{2}$, consists of three different marks, the two figures and the horizontal line.

Professor Miller.

18. The weights for weighing bullion are decimal. No inconvenience would arise from using Decimal Coinage, leaving the weights and measures unchanged. Our coinage is not so far binary as our weights. The binary system in weights arises simply from want of skill in the arts at the time the present weights were introduced. This system is an ignorant application of the binary system to the old Roman 10 libræ weight, which approaches very closely to our 7lb., and from which our 7lb. was obviously derived.

19. Yes. It would require but small pressure to substitute 100lbs. for the hundredweight, 50lbs. for 56lbs., 25lbs. for 28lbs., and 10lbs. for the 14lbs.

20. How many articles are sold at the exact price of 1*s.* per pound compared with those sold at different prices?

21. This assumes that 1lb. costs exactly 1*s.* Meat, tea, sugar, coffee, articles most commonly bought by the poor in small quantities, do not cost exactly 1*s.* per pound

22. In all these particulars the change would be beneficial.

23. All this assumes that the unit of weight or length costs exactly a multiple of the unit of money.

The proposed Decimal Coinage would greatly promote the use of the single mil, which would be a great advantage to the working classes. If the pound of tea costs exactly 3*s.*, the poor man would not get an ounce for $2\frac{1}{4}d.$

The Spanish piece of $6\frac{1}{4}$ cents differs from 6 cents by half a farthing,—no very great loss. Have the Americans no 5 mil piece to pay the $12\frac{1}{2}$ cents?

24. This supposes a people so rude as not to possess either weights or measures.

This is a great mistake on the part of Mr. Q. Adams.

This division of the Spanish dollar took its origin in the practice of forming small coins by cutting the dollar in two with a chisel and mallet, then each half in two, then each quarter into two, and lastly, each eighth into two. The $\frac{1}{16}$th of a dollar obtained in this manner was called a bit. An expert operator, however, went to work in a different manner, and extracted 17 bits from a dollar, each of which passed for the value of $\frac{1}{16}$th.

This inconvenience arises from the circulation together of two different systems of coinage.

The remedy is the withdrawal of the old coins from circulation. As they form a considerable proportion of the (silver) metallic currency in the United States the remedy is not easily applied. With us the case is widely different.

25. Division by 2 is not convenient. It has been frequently remarked, that a gold coinage of 5*s.* would not be so convenient as one of 6*s.*; because with the former, and the gold coins of 10*s.* and 20*s.* only multiples of 5*s.* could be made up; while with the latter 2*s.*, 4*s.*, 6*s.*, 8*s.*, 12*s.*, 16*s.*, &c. can be made up. So also the 4*d.* silver coin is preferred to the 3*d.* coin.

26. I cannot agree with Sir J. Herschel in considering this misfortune great.

A Decimal System of weights and measures certainly ought to be adopted, but, if there is any difficulty in obtaining such a system,—and I believe there might be a difficulty in introducing a decimal subdivision of the yard or of the foot,—the change in weights would be much easier; do not on that account deprive us of the advantage of a Decimal Coinage.

27. It would be a great convenience, but by no means essential to the efficiency and usefulness of a Decimal Coinage. My own opinion is, that the introduction of Decimal Coinage should precede any attempt to decimalize weights or measures.

28. The whole advantage of a Decimal Coinage would not be obtained till weights and perhaps measures were decimalized likewise. The gain, however, from a decimalization of the coinage, without waiting for that of weights and measures, is so great, that no effort should be spared in trying to obtain it. It must also be remembered that the decimalization of our coinage is a very easy matter.

a. This is done in the most roundabout way possible, and a long string of useless decimals retained, in order to make the example look complicated.

b. Much is gained.

29. It will not tend to make the present system of weights and measures inconvenient. But it will tend to make the public understand and feel the advantage of decimal scales generally; and this may not force, (see section 31,) but lead the country into the adoption of decimal weights and measures.

a. It is impossible in any system to liquidate accurately all reckonings.

30. Is the convenience of subdivision a matter of any importance? Facility in counting appears to be of much greater value.

31. The change, if made, would very probably lead the country into the adoption of decimal weights, and possibly of decimal measures.

32. When a Decimal Coinage is proposed it is objected that decimal weights and measures ought to precede. If a decimalization of weights and measures had been proposed the objection would have been that the Decimal Coinage should have been introduced first. Next, the introduction of both together is a scheme too vast to be contemplated. And so the present inconvenient system must remain in use to the end of the chapter.

33. The reason on which this recommendation is founded is undoubtedly wrong. I apprehend the only possible reason for such a recommendation is the difficulty of making a change so extensive. In measures of length the difficulty would be great; in weights it would be inconsiderable. In money where the change is so small, affecting only the copper coinage,—and the power of making the change rests with the Government,—the difficulty is trifling.

Analytical chemists, who use the balance more than any other class of persons, and are not restricted by law to the use of antiquated and inconvenient weights, always use decimal weights; either the grain and its multiples and submultiples by 10, or else the French system of weights. The use of the latter has greatly increased of late. It so happens that the magnitude of the kilo-

gramme and its subdivisions, as well as that of the mètre and its subdivisions, renders them much more convenient for use than our lb. and the yard with its subdivisions into inches and tenths or eighths.

34. In times and places where material civilization did not exist, every trader was his own balance and weight maker, and subdivided his measures of length for himself. In such a case it was easier to use a binary scale than any other. At the present time, in this country, weights and measures of length are obtained from people whose business it is to make them, and to whom it is just as easy to construct decimal multiples, and submultiples of the unit of length or of weight as to construct them according to any other system.

Systems of weights proceeding according to the binary scale are sometimes used. Sir G. Shuckburg used them in his experiments on the weight of a given volume of water. I have employed them occasionally. I find that they are not convenient on account of the trouble of making out the amount of the weight employed. To make up a given weight with them, or to pay a given sum with money thus subdivided, would be very perplexing.

35. The natural thing in our subdivision of the pound is, that it was adapted to the systems of arithmetic in use among the Scandinavian, Anglo-Saxon, and Celtic races, by whom this country was peopled, which proceeded by twelves and twenties or scores, remnants of which are found in the 'gross' and 'schock,' noticed in the remarks on section 13. Now, the natural subdivision of the unit of money, the £1, is that which is in accordance with the system of arithmetic at present in use, *i. e.*, the decimal subdivision.

36. How often is the price of a whole 'thing' exactly a dollar, or half a dollar, or a quarter of a dollar?

In every case of buying and selling, small differences—less than the smallest coin in circulation—must be disregarded, whatever subdivision of the unit of coin we adopt.

Small fluctuations in the price of a large quantity of an article sold must be met by disregarding small differences.

a. I do not see the advantage of the possibility.

b. The loss, I imagine, usually falls upon the purchaser; he, therefore, ought to be provided with small coins. His loss will then be not greater than the least of these.

c. In all sales and in all money transactions, whether of broken or unbroken parcels, small money remainders must be neglected, when they are less than the smallest coin practically in circulation.

d. These sums are selected on purpose. In the course of trade it might just as easily happen that the price was more easily divisible by thirty-two if expressed in mils.

e. Again, assuming the price of the unit of article to be the unit of coin.

f. The contrary may be the case just as frequently.

g. The prices are determined by the cost of production, combined with competition—not by competition alone.

37. Addition, subtraction, and multiplication, on a small scale, are the chief arithmetical operations required in the market or huxter's shop; division very rarely. A purchaser asks for one ounce or two ounces, not for $\frac{1}{16}$th or $\frac{1}{8}$th of a pound of tea, with us; or for 3 or 5 grossi, not $\frac{3}{100}$th or $\frac{1}{50}$th of a libbra of tobacco, in Lombardy. The buyer in one case thinks only of the price of the ounce of the article, in the other of the price of the grosso. For, though it makes a good example in a book of arithmetic to deduce the price of the ounce from that of the pound, by dividing by 16, yet in trade it is well known that the price of the pound is invariably less than 16 times that of the ounce, in price, or in weight, or in quality.

In a country where the coinages of two or more countries circulate together, a money of account different from one or all of the material coinages may be possible, though a great inconvenience. With ourselves, the inconvenience would not be tolerated.

38. 1st—No.
2nd—No.
3rd—Yes; and for this reason they should be decimal with their value marked upon them in terms of the next lower unit, or perhaps of the lowest unit.
4th—Yes.
5th—That this is the natural tendency is assumed.

39. It is accidental, being due to the progression by twelves and twenties of the arithmetic of the Scandinavians, Anglo-Saxons, Phœnicians, and Celts.

What was the reason for retaining the inconvenient guinea so long?

40. The advantage of this divisibility is purely imaginary.

41. These divisions are not required. Objections 1, 8, 9, 10, 11, 12, 13, over again.

42. I do not admit this. A coinage of account differing from the actual coinage is a thing not to be tolerated in a civilized country. For this reason, at last, the guinea was suppressed.

43. Why are all these decimals added?

The nearest integer mil is surely accurate enough. The second line should be 333, the fourth 167, the sixth either 62 or 63.

a. This would be to introduce a money of account different from the coins in use, for I presume nobody would be wild enough to think of withdrawing our present gold coinage, and the 2*s.*, 1*s.*, and 6*d.* silver coinage. Besides, the new money of account in large sums would be unintelligible both to ourselves and to foreigners, and would require to be reduced to pounds.

Unit of 100 halfpence would be near enough to the American dollar, to be used in very small retail dealings, which do not occur between the two countries, and different enough to require reduction in accounts to the amount of ten shillings.

44. No. It consists in taking the lowest money unit, which the case requires, &c.

45. The £ is the basis of the system. The mil is not to be used unless the case absolutely requires it, and even then should the final result give 10 or 20, or any other multiple of mils by 10, the final 0 might be omitted, and so of the cent and florin.

Professor Miller.

If conciseness and simplicity of expression are of more importance than accurate dealing we might stop at the pound.

a. Not in the least. The proposed new system involves only three columns after the pounds, with room for one figure each. The present system, stopping at a penny, frequently has four figures after the pound column. The omission of all sums under a penny greatly deranges money accounts.

b. No; each fraction consists of three marks. This result, in the United States, arises from the inconveniently small size of the smallest unit. The mil is too small for a coin, and it is very difficult to introduce into an account a coin that has (practically) no material existence.

46. A coinage different from that in which accounts are kept, is very perplexing. Large sums, expressed in any unit except pounds, could not be distinctly apprehended, and would, therefore, on every occasion, require to be reduced to pounds. Such a change as is here proposed would be troublesome to foreigners, who all know the value of a pound in terms of the coins of their own country.

The pound for the unit, with its present inconvenient subdivision, is preferable to the penny as unit.

The recommendation of the penny as unit would tend more than anything else to postpone the decimalization of our coinage.

47. Yes; a great disadvantage. Each of the sums $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, consists of 3 separate marks, equivalent in trouble to three figures.

It is not the case that the ultimate subdivision is binary where the Decimal System is completely carried out: Switzerland, for example.

In the franc coinage the centime is a coin so small as to be seldom used, and is hardly required in accounts. $\frac{1}{100}$th of £1 = $2\frac{1}{2}$ centimes, is not too small to be used in payments or in accounts. In France the Decimal System is not so completely carried out as in Switzerland, in consequence of retaining the old copper coinage with the name of sou, though now the use of the word sou is growing less frequent.

The inconvenience of uniting such values as fractions is that each consists of three marks. They are not by any means so easily added or multiplied as in a decimal form.

48. The '£1' and mil scheme is not recommended for comprehending in a Decimal System of notation all the fractions of a penny, but to render easy the arithmetical operations regarding coins between £1 and the lowest coin, and of avoiding the inconvenience of dividing the £1 into 20*s.* and the shilling into 12 pence. A proof of the inconvenience of the present system is afforded by the slovenly habit of omitting the fractions of the penny.

49. This would be quite useless on account of the trouble of converting pence into decimals.

People always think in pounds. A moderate sum expressed in pence would convey no idea.

50. At present the prices of many things, such as wine per dozen, coals per ton, are stated in shillings, without introducing difficulty or confusion.

51. Prussia, Saxony, Naples.

52. Not in the least.

53. The American dollar = 50·17 pence. 1 cent = $\frac{1}{2}$ penny nearly. 1 mil = $\frac{1}{20}$ of a penny = $\frac{1}{5}$ farthing.

The inference to be drawn from these facts is, that the cent is not small enough for the smallest coin, and that the mil is much too small.

Experience seems to prove that in this country, where prices are high, the farthing is about the smallest coin that can ensure a circulation for itself. The half farthings coined some dozen years ago were, I believe, very little used. Shopkeepers have an interest in keeping small coins out of circulation. The Government, in its care of the interests of the poorer classes, ought to keep up an abundant supply of the smallest useful coin. For this reason I should like to see a coinage of single mils only (not 2 mils or 5 mils) below the cent.

The United States Mint does not obey the law of 1792.

It is not the number of steps, but the small value of the lowest unit, that is inconvenient and unworkable.

When the lowest unit is too small and the next higher unit is too large there is a strong inducement to use $\frac{1}{2}$ or $\frac{1}{4}$.

It is because the American coinage is not decimal throughout.

According to Wilson's Diary for 1853 the copper coins of the United States are 1 cent, $\frac{1}{2}$ cent, and $\frac{1}{4}$ cent.

"UNITED STATES.

	s.	*d.*
1 dollar = 100 cents - - - - - - =	4	0
1 cent - - - - - - - =	0	$0\frac{1}{2}$

Gold coin—Eagles and half-eagles, or 10 and 5 dollars = 40*s.* and 20*s.*

Silver coins—They have both Spanish and American dollars, and 2, $\frac{1}{2}$, and $\frac{1}{4}$ dollars; 10, 5, and 1 cent pieces; also $\frac{1}{8}$ and $\frac{1}{16}$ dollars, or 1 and $\frac{1}{2}$ shillings (not English), equal to the Spanish 1 and $\frac{1}{2}$ reales.

Copper coin—1, $\frac{1}{2}$, and $\frac{1}{4}$ cents."

54. What harm is there in this? In Prussia the thaler is divided into 30 silver groschen, and the silver groschen into 12 pfennige. In Saxony the money of account consists of thalers, gutegroschen, and pfennige. 1 thaler = 24 gutegroschen, 1 gutegroschen = 12 pfennige. In Lübeck the money of account consists of marcs, schillings, and pfennige. In Naples it consists of ducati, tari, carlini, grani. The subdivision would only be into 100 parts, unless greater accuracy is required. Or into only 10 under the circumstances above mentioned.

55. A difference in our favour. Having a larger unit with a name, and other convenient units, also with names, to take hold of the memory in mental calculation.

Professor Miller.

56. On this account the £ as an integer has a great advantage over the franc, dollar, gulden, or silver rouble.

This is no advantage.

57. Not in the least.

These steps will not be inconvenient if we select good short names for them. The name of florin for the first is very unfortunate. That word being in Austria used to denote a coin worth 2*s.* 0·39*d.*; in the Zollverein, a coin worth about 1*s.* 8*d.*; in Holland, a coin a trifle smaller; and in Poland, a coin worth 5·62*d.* Rose, the name suggested by Wyon, or rupee, as suggested by Sir John Herschel, would have been much better. Rupee is a very appropriate name, being the word for silver in sanscrit, the parent of the languages of Europe. The steps of 10 places each, with appropriate names, would furnish convenient resting-places for the memory in mental calculation. The calculator would use just as many of them as were serviceable and no more, and, with the aid afforded by additional names, might perform calculations that would be impracticable with the franc or the lira for unit.

58. This is no disadvantage. Objections 8, 9, 10, 11, 12, 13, 41 over again.

59. Sums less than a penny are omitted on account of the intolerable clumsiness of our present system. In the mil system no sum less than £1 will require more than three figures in order to be recorded accurately to 1 mil. In our present system, in order to be accurate only to 1 penny, the entry of a sum less than £1, on account of having 20*s.* to the £1, in half the number of items requires 3 figures, and on account of having 12*d.* in the shilling, in $\frac{1}{6}$ the number of items requires also three figures, and in $\frac{1}{12}$ of the number of items requires four figures. The difference in the number of figures, if in one case we stop at the mil, and in the other at the penny, is very small. On the other hand, having only one figure to a column is a great advantage. The width of column in the new system is less than in the old. In the present system there is great inconvenience in not expressing accounts in terms of the smallest coin practically in use. It is not known whether certain discrepancies are due to a mistake, or to the omission of all sums under one penny in bankers' accounts.

The proposed new system will very greatly diminish the trouble, and at the same time introduce more minute accuracy.

60. I see no advantage in the divisibility of the 1*s.* and 6*d.*

61. A poor person never asks for a 'third' of anything.

This division of material substances is not often required.

The division of any material substances into 5 or 10 parts does not require the aid of calculation any more than division into 2 or 3 parts.

62. In Switzerland a revolution is got up on very small provocation. I never heard of any disturbance produced by the late sweeping change in the coinage of that country.

Any possible loss or injustice would be most trifling compared with that which of necessity occurs in every purchase where the fair price is one half of the halfpenny—the smallest coin practically in use—less than the price demanded.

This change would interfere—not with a large portion of existing contracts, but with every existing contract.

These apprehensions are not well founded. The difficulty is of no importance, except in tolls—a penny or halfpenny toll is demanded, not because a penny or halfpenny is the fair price for the convenience of using a bridge or for keeping a road in repair, but because it so happened that the coins in existence were a penny and a halfpenny.

63. The lower classes will derive a larger benefit than the higher from the abundance of the small coinage put into circulation.

64. I have never found small money transactions so easily carried on as in Switzerland, where the Decimal Coinage is perfect.

The shillings and pence above nine, especially those which consist of two words—such as sixteen—are very perplexing in calculations performed in the head.

For distinctness of mental conception and facility of calculation the Decimal System, in which no small coin would enter with a higher number than 9, is much superior to one in which 10 . . . 19, and 10, 11 occur.

65. The brevity and convenience of expression, oral and written, which attaches to our present coins, remains to be discovered.

W. H. MILLER.

(*Communicated by Lord Monteagle.*)

W. MILLER, Esq., Cashier of the Bank of England.

W. Miller, Esq., Cashier of the Bank of England.

Answer to Question 1.—I do.

2. I have no objection to any of them down to the sixpence, and my only objection to the lower coins consists in their not being in decimal relation to the rest.

3. I have no objection to the coins as quantities, and consider them in that respect well adapted to our wants, and therefore would preserve them all, except that I would give the pence a decimal relation to the florin and pound. This would render the coinage much more valuable for all purposes of retail transactions, and indeed for all other transactions.

W. Miller, Esq., Cashier of the Bank of England.

The whole coinage might then be recorded and dealt with arithmetically.

The present irregular gradations of money are a great hindrance to education. This has been well proved, but it is the most serious hindrance to the acquisition of the science of arithmetic to those to whom a thorough knowledge of it would be of the greatest service. Watchmakers, machinists, carpenters, masons, handicraftsmen of all kinds, whose schooling seldom exceeds three years, have no time for scientific arithmetic or practical geometry. Their minds are burdened and confused by the immense number of heterogeneous quantities they have to deal with in compound arithmetic, and they make no progress.

Therefore, and for many other reasons, my objection to our present system is not restricted to the disadvantages which attach to it in keeping accounts of money, or to its application to calculations of money, though the inconveniences in these would be alone sufficient in my mind to justify a change.

4. I consider the primary purpose of coins to be to pay debts.

I do not consider them as fractional subdivisions of the integer, but as integers or aggregations of integers. This is how the system was constructed, per synthesis :—Before the introduction by the Normans of the Roman shilling, 32 corns of wheat taken out of the midst of the ear were of the weight of one silver penny, which was the chief coin; 5 pennies made a shilling, which was not a coin, but a weight of silver, and 60 shillings made the pound. This was both weight and money. It was not uncommon to write large sums in pence decimally.

The coins were then all of one kind. Accounts of money all of one kind are more easily kept, and calculations are more easily made, and if the coins also are all of the same kind or denomination, they will accord with the terms of the account or of the calculation, and the money will be easily reckoned. To have the money of account recorded in one denomination and to pay or receive the coins in another, would be a monstrous absurdity, not to be tolerated for a moment if it were possible to avoid it

5. I cannot see two purposes. If they are best for accounts and best for calculations, they must necessarily be best for the discharge of those accounts and calculations, being in the same terms.

6. It is. A large proportion of the retail purchases are made for the coin's worth, or the articles are made to be sold for the coins. The question of the merit or demerit of any system of coins must depend upon their adaptability to all payments, great as well as small.

I know of no complaint, except that which I have stated in reference to their non-arithmetical relation, therefore it is that I wish to retain them.

The use of the coinage is undoubtedly the first consideration, and the only object any one could have in altering it would be to add to its usefulness. The use of the coinage is to pay debts, large or small, whether recorded in accounts and the subject of calculations, or reckoned on the spot, without pen, ink, or paper.

Almost all retail market commodities are sold either by tale or by weight.

Vegetables.—Greens, watercresses, spinach, and other small things are sold for the money's worth.

Turnips, carrots, parsnips, radishes, onions, &c., are made up into bunches to fit certain coins.

Cabbages, cauliflowers, lettuces, celery, horseradish, apples, pears, cucumbers, melons, and most fruits are sold by tale according to their size and quality.

Potatoes are sold by weight, generally, in London; in the country, very often, by the peck.

Peas and beans by the peck and its parts.

It is quite clear that here 1,000 parts would have the preference over 960, as they would afford more gradations of price.

Fish.—Herrings, mackerel, haddocks, soles, whiting, and nearly all other small fish are sold by tale, as are also lobsters, crabs, oysters, and prawns, according to quality.

Salmon, turbot, cod, eels, and sturgeon are either weighed or sold singly. If weighed they would be weighed to two ounces. Dried salmon is weighed to an ounce.

Poultry and eggs are sold by tale.

Butcher's meat is sold by the pound.

Bread, butter, bacon, cheese, are also sold by the pound.

But bread is most frequently sold by the loaf without a very nice regard to weight, and fancy bread, biscuits, and other baker's commodities are sold by tale. Biscuits sometimes are sold by weight.

The articles here mentioned that are sold by tale, could, as was said of the preceding class, be better fitted with their prices in mils than under the present system.

The articles sold by weight are generally of uneven weight, except butter and bread. You ask for a pound of cheese or bacon, and you get a pound and one or two ounces. Beefsteaks and chops the same; the vendors cut as close to the weight as they can.

In weighing joints of meat, it is the custom of butchers to weigh only to two ounces. These cases of uneven weight are the most difficult to deal with under the present system, and are supposed by some to be much more so under the mil system; yet when they are thoroughly inquired into it is surprising how all the difficulties vanish.

In London alone there are upwards of 20,000 retail shops, in which the fractions of a penny are in constant use.

Of 1,000 sales made in these shops, those with the fractions of a penny would bear the proportion of about 400 to 600 with even pence.

Of the 20,000 shops there are about 800 cheesemongers and bacon factors, and 1,740 butchers. These latter cannot divide their commodities into even pounds; nor always cut off from the mass as much meat, or cheese, or bacon as would exactly meet the requirements of their customers.

I have examined the small books that pass between butchers and their customers in various parts of London and the districts round, and they all tell the same tale, whether you take Giblett's of Bond Street, Bannister's in the City, or any of the suburban tradesmen's books. There is a slight difference in the prices, but the principles upon which the business is transacted are precisely the same.

Out of upwards 3,000 entries there is not a single instance of weighing below two ounces, except in the case of a steak or chop or veal cutlet, where the weight has been below a pound.

The following is a page from one of the books, and is a fair specimen of the ordinary working:—

1853	A. As it is. —	Weight.	Price per lb.	—	B. As it would be with Decimal Coins. Weight.	Price per lb.	—	C. As it would be with Decimal Weights and Coins. Weight in Decimals.	Price per lb.	—
		lbs.		£ s. d.	lbs.		£ F. M.			£ F. M.
April 25	1. Shoulder of lamb	5½	11*d.*	0 5 *0	5½	46	0 2 53	5·5	46	0 2 53
„ „	2. Beef steak - -	1 14 oz.	8*d.*	0 1 3	1 14 oz.	33	0 0 63	1·9	33	0 0 63
„ 26	3. Rump steak -	1¾	1*s.*	0 1 9	1¾	50	0 0 87	1·75	50	0 0 87
„ 27	4. Leg of mutton -	8¾	8½*d.*	0 6 2½	8¾	36	0 3 15	8·75	36	0 3 15
May 2	5. Fillet of veal -	8¼	10*d.*	0 6 10½	8¼	42	0 3 46	8·25	42	0 3 46
„ 4	6. Lamb chops -	1 6 oz.	1*s.*	0 1 4½	1 6 oz.	50	0 0 70	1·4	50	0 0 70
„ „	7. Suet - - -	½	8*d.*	0 0 4	½	33	0 0 17	·5	33	0 0 17
„ 5	8. Calves' liver -	1½	8*d.*	0 1 0	1½	33	0 0 50	1·5	33	0 0 50
„ „	9. Leg of mutton -	8½	8½*d.*	0 6 *0½	8½	35	0 2 98	8·5	35	0 2 98
„ „	10. Leg of lamb -	5	10*d.*	0 4 2	5	41	0 2 05	5·	41	0 2 05
„ „	11. Suet - - -	½	8*d.*	0 0 4	½	33	0 0 17	·5	33	0 0 17
„ „	12. Brisket of beef -	8	7*d.*	0 4 8	8	29	0 2 32	8·	29	0 2 32
				1 19 0			1 9 53			1 9 53

* Errors in the original, which make a difference in the totals.

Let us examine what difficulties there are attending all three systems in working out these reckonings by head, supposing that they were purchases made in the market to be reckoned instanter.

A 1. 5½lb. at 11*d.* Half is 5½*d.*, and 5 × 11 = 55, and 55 + 5½ = 60½*d.*, which, by the pence table, we know to be 5*s.* 0½*d.*

B 1. 5½lb. at 46*m.* Half is 23, and 5 × 6 = 30, which + 23 = 53, and 5 × 40 = 200, and 200 + 53 = 253.

C 1. 5·5 at 46. Half is 23, and 23 × 10 = 230, which + 23 = 253.

A 2. 1lb. 14oz. at 8*d.* = 2lb. − ⅛th, and 8*d.* ÷ 8 = 1*d.*, and 8*d.* × 2 = 16*d.*, and 16*d.* − 1*d.* = 15, and 15*d.* = 1*s.* 3*d.*

B 2. 1lb. 14oz. at 33. = 2lb. − ⅛th, and 8 ÷ 33 = 4, and 33 × 2 = 66, and 66 − 4 = 62.

C 2. 1lb. 9 dismes at 33. 3·3lb. × 9 = 30, and 30 + 33 = 63.

A 4. 8¾lb. at 8½*d.* Call it 9lbs. − ¼. Then ¼ = 2*d.*, and 9 × 8*d.* = 72*d.*, and 72*d.* = 6*s.*, and 9 × ½*d.* = 4½*d.*, and 4½ + 6*s.* = 6·4½, and 6*s.* 4½*d.* − 2*d.* = 6*s.* 2½*d.*

B 4. 8¾lbs. at 36 mils. Call it 9lbs. − ¼. Then 36 mils ÷ 4 = 9 mils, and 36 × 9lbs. − 9 mils = 315.

8·75 at 36. Here 4 times 9 = 36. Then 8·75 × 4 = 35, and 35 × 9 = 315.

Enough is here given to shew that even in these most trying cases, a Decimal Coinage is worked by head, and by a head burdened by the pence table, with more facility than the present admits of. It is true there are insignificant fractions of a mil occasionally thrown over, there are the same in the pence; but they are of no consequence to any one; and the great advantage of displacing a system of makeshifts, learned by rote, special and technical, for one purely arithmetical, and of universal application, is not to be overlooked.

The poor often buy a single candle, an ounce of butter, an ounce of cheese, a rasher of bacon, half an ounce of tea, and so forth. Upon these small transactions they are great losers, and always must be. There is as much trouble in weighing and making up an ounce of tea as of a pound. In these minute divisions, besides the loss of time there is a greater waste.

In these small matters I am convinced that the mil system would be of advantage over the present.

There are 2700 grocers' shops in London. The grocers weigh to exact pounds, half pounds, and quarters, but no lower by the divisional process; they then go to ounces and aggregations of ounces; and this is the case in every other trade where weight is used, and exact weights can be given. In all these the pound and mil would serve better than the present system.

There are 1040 linendrapers. These frequently reckon to the one-sixteenth of a yard; but there is no difficulty in this any more than there is with the ounce.

W. Miller, E
Cashier of t
Bank of Engla

W. Miller, Esq. Cashier of the Bank of England.

In all these dealings there would be this great advantage, which would be the saving of many a penny in the poor man's marketing, that all persons would reckon to the mil, the 1000th of a pound, while at present there are a great many tradesmen who never go lower than a halfpenny partly on account of the difficulty of paying a farthing, which would not apply to the mil.

With an abundance of five mil pieces and the present pence a difficulty of this kind could hardly be felt.

In considering the "use of the coinage" I have wandered perhaps rather too far; but my object has been to demonstrate once for all that in the distribution of commodities in the retail markets, the mil system of coinage would more effectually answer every requirement than the system of of coinage at present in use.

7. I do.

8. It is not impossible; on the contrary, it is obviously quite possible to break the integer into more clear fractional parts than under the present system. Under the mil system, the pound can be divided, of course, by 1000 divisors, without a remainder. Under the present system, it can only be divided by 960.

For the adjustment of prices, 1000 parts will give a greater variety than 960, and must be so far preferable.

In marketing, generally, beyond halves and quarters, people do not divide. When halves and quarters fail them, they go down to a lower denomination. Where pounds are concerned, to ounces, and so on.

If the money of account be fairly represented in the coins, and it descend to so low a value that anything beneath it would be of no consequence to any one, as in the Mil System it would do, I can see no objection to the Decimal System.

9. This is simply a re-assertion of the matter in dispute.

If the gradations of money, weights, and measures were all gradations of 12, if that were the governing number of a system which worked well, the passage would have some force, notwithstanding decimal arithmetic; but we have no system. Where a system ought to be, we have but an accidental accumulation of upwards of one hundred and fifty incongruous units; the duodecimal shilling we received at the point of the Conqueror's sword. These various units are the remains of many barbarisms, which hinder education, and stultify the mind.

Authority in such matters, weighed against the experience of nations, and the conclusions of reason, is not of much gravity, however old it may be; it only affords additional evidence of the fact that wise men have been mistaken in all ages.

The following, which is an extract from a rare tract lately reprinted by the Political Economy Club, entitled, "Quantulumcunque, concerning Money," to the Lord Marquess of Halifax, by Sir William Petty, 1682, is a fair counterpoise to the extract from Vaughan.

"The use of farthings is but to make up fragments in silver, and to adjust accompts; to which end of adjusting accompts let me add, that if your old defective farthings were cryed down to 5 a penny, you might keep all accompts in a way of decimal arithmetic, which hath been long desired for the ease and certainty of accompts."

To the first part of the extract from Napoleon's Memoir, a conclusive answer is to be found in the fact, that with all his boldness and all his power, he never proposed to abandon the Decimal Coinage; and the concluding step of the issue of the centime in bronze has been completed in the present reign. But the remarks in the latter part of the extract are directed against the Decimal system generally, and are diametrically opposed to fact and reason. The fallacy of them consists in the supposition that the Decimal System renders thought more laborious. It is a fact that the best and quickest mental calculators use the Decimal mode. There are some people, and mere boys of fourteen years old, who can extract the cube roots of numbers, and can multiply long lines of figures together, entirely by head. We had a boy who could do this, in the Bank of England, a short time ago; but he knew little of weights and measures, nor had his brains been much addled by compound arithmetic. But these people, before they commence their work, get rid of all incongruous quantities. And it stands to reason that this would be the case in the natural course of things.

The arithmetical system is a purely natural system, based upon decimal numeration, and decimal numeration has sprung up spontaneously, as Quincy Adams observes, "from the nature of man and things." Being, thus, a natural mode, it would seem to follow that the practice of it should be more conducive to the health of the mind than the practice of any other; and that, therefore, instead of the contrary, this method universally applied should be the best calculated to "aid conception and imagination, to assist the memory, and give power to thought;" and that the practice of any other, special and confined as it must be in its application, would have a tendency to weaken the powers of the mind by limiting the scope of their operation.

Man's first instruments of number were the five fingers on each hand.

That they were five was no accident. Nature has a peculiar regard for the number five, and has had from the earliest manifestations of life upon earth to the present age, and it is no idle fancy nor irreverent, to suppose that, as the fingers existed in the Divine mind, and were elaborated in nature, through the rude shapes of the geologic ages, they were five in number because they were destined to become to the future man the most admirable and perfect instruments of his intellectual faculties, and amongst them of that of number.

And when man impelled by his nature recorded his countings, and founded the numeration table for all ages, he unconsciously took up for the human mind a preordained burden not too great for its powers.

There never was a duodecimal arithmetic, and though the Romans sowed their *unciæ* broadcast over the earth, a duodecimal arithmetic has nowhere sprung up.

Our compound arithmetic leads the minds of the generality of people away from the healthy practice of a natural and universal science, and encumbers them with a multitude of special contrivances, which make the very idea of arithmetic distasteful in the highest degree.

The considerations in No. 9 are altogether opposed to experience and reason, and are of no value whatever in this argument.

10. I cannot imagine such a combination. A binary scale may consist of any of the products of two; but when you introduce another power into any of the gradations of the scale, you destroy its binary property immediately. Such a combination cannot exist as a duodecimal and a binary

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scale. Try whether ours is such. You cannot divide a pound by two and come down either to a shilling, a penny, or a farthing. You cannot divide a shilling by two and come down either to a penny or a farthing. You cannot divide a pound by twelve, and come down either to a shilling, a penny, or a farthing. You cannot divide a penny by twelve. Wherein then consists the combination of the binary and duodecimal properties of the scale?—There is no such thing. 12*d.* can be divided by twelve and its factors, so can 12 mils. There is nothing in nature that makes the value of a shilling a constant and unvarying price. There is hardly anything in a grocer's shop, or any other shop, a shilling a pound; but it is just as likely to be 10*d.*, 11*d.*, or 13*d.*, or 14*d.* or intermediate halfpence or farthings; and it is a curious fact, that of common things, exactly a shilling a pound or a yard, is an exceedingly rare price, especially in those commodities in which the poor principally deal.

Between the farthing and the shilling there are 48 different prices of course; between the mil and the shilling there are 50. Of these there are prices divisible without a remainder:—

		In the farthings,	In the mils,
by	2	24	25
„	3	16	16
„	4	12	12
„	5	9	10
„	6	8	8
„	7	6	7
„	8	6	6
„	9	5	5
„	10	4	5
		90	94

Now, every one of these prices could be paid in mils without the passing of a single mil, which is an immense advantage over the present scale.

But the overwhelming advantage which the decimal scale possesses is the power of obtaining a percentage without any arithmetical operation. This capability of division or multiplication by 10, 100, 1000, and so on, is cautiously kept out of view by those who talk about duodecimal and binary combinations.

This proves beyond all question that the decimal system proposed by the Committee of the House of Commons, going no further than the favourite shilling, actually affords four more gradations of price, evenly divisible by prime numbers, than the present scale.

How then can there be "an inferiority as regards fractional divisibility" in the proposed decimal system of coins?

11. I do not deny the powers of the number 12; but applied to things that are to be subjects of arithmetical operations, it destroys the rhythm of the decimal scale and introduces confusion. I see no force in the remark of Napoleon.

12. 1stly. Were it not that I have the pence table in my mind, I should say certainly not the first; but it depends upon use.

2ndly. If we have the mils, we shall no longer be working with half crowns or seven-and-sixpences, but with sums of mils. We make up our minds to relinquish this power when we propose our system of mils. But the half mil is a quantity of no value, except where it is part of a price; and in all cases of that kind of course it would be expressed. It is not to be supposed that any of the supporters of the mil scheme of coinage contemplate the disuse of vulgar fractions. They might as well think of getting rid of arithmetic altogether.

3rdly. The calculation with the mil system is decidedly the easiest; and when a person becomes accustomed to the values of those regular decimal divisions of the integer, it would be done at a glance.

4thly. "Take half-a-crown, &c." People do not take half-a-crown and double it, and halve it, and so on. There is nothing in the half-crown which makes this easy. 30 mils would do just the same. With 125 mils considered as $\frac{1}{8}$th the calculation is just as easy.

5thly. Price's candles. The difference would be that when Price had got rid of his stock, he would make up his candles in the more convenient quantity of 10lbs. to the box, and sell them at 460 mils the box, and then every one would know that a pound would be 46 mils; and if that were too much, somebody would set set up candle making and undersell him.

6thly. We prefer to call it 125, and admit that you cannot pay a single fraction named. What then? The utmost that can be left out of the reckoning is half a mil, or 4 per cent. less than half of a farthing. Half-a-crown is no more a frequent price than a shilling, and 120 mils are just as likely to occur as half-a-crown as a price of those things which are sold in divisions of the pound or yard. Again, the greater number of these fractions are never made. The halves, quarters, and eighths of yards are made of velvet, silk, or of some expensive material, and then the shopkeeper always contrives to take the fraction to compensate for his trouble in making so small a sale, and this is always expected by the buyer and readily conceded.

But fractions of this kind, I mean those which cannot be paid, it has been shewn, in answer to Question 10, are and must be more numerous under the present system than under the mil system.

In purchasing a quantity of diaper or cotton stuff, for towels or pinafores or things of that kind, a certain length is required for each, and they amount up in the whole to so many yards and an eighth, there is almost always a fraction, because the price of the whole yard might be anything from 7$\frac{1}{2}$*d.* to 15*d.*, rising by farthings or halfpence, and the fraction goes sometimes one way, sometimes another, and nobody either gains or loses anything in the end.

Payments, too, under the mil system would generally be made to greater nicety than they are at present; for now the farthing is often omitted; then the mil, though it would be excluded from banking and mercantile accounts, would always pass, because it would not need to be paid in the coin itself, as the four and five mil pieces would always serve.

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7thly. 125, the equivalent of half-a-crown, would be paid with that coin.
124 mils would be paid much more easily than 2*s.* 5¾*d.*
62 mils would be paid in 1 shilling and 3 ordinary pennies.
Nothing could be better or easier; but it is not by a few selected cases, and selected because they are favourable to one side of the question, that the relative value of the two systems is to be judged.

13. Nearly the whole of this question has been dealt with before.
The construction of coinage is not a divisional process. We know well the history of our coinage, and we know that it was accumulative and not divisional.
What Mr. Adams meant by the "Decimal arithmetic" not being "adapted to the multiplication of material substances," is hard to imagine, without further explanation, so we must leave this question.

14. A common triumph the Decimal System has over any other is the comparatively small number of figures used; but it is not so much the smallness of the number of figures used, as the ease with which they are used, which constitutes the excellence of the Decimal System of money.
Such comparisons as these are of no value. They are but "indifferent honest." The best answer to them is, that between the pound and the mil there are 1000 steps; between the penny and the pound there are 240. Let the farthing be introduced into the comparison, and see how the case stands.

£	*s.*	*d.*		Mils.		Pence.
1	0	0¾	=	1·003	=	240¾
0	17	8¼	=	885	=	212¼
0	15	6½	=	777	=	186½
0	9	9¾	=	491	=	117¾
0	6	3¼	=	314	=	75¼
0	5	7½	=	281	=	67½
0	4	10¾	=	245	=	58¾
0	3	8¼	=	184	=	44¼
0	2	4½	=	119	=	28½
0	1	5¾	=	73	=	17¾
£4	7	5¼		£4·372		£1049¼
		49 figures.		34 figures.		50 figures.

The penny does not comprehend the whole of our wants.
The following are all the gradations between the farthing and the mil and a shilling The present system requires 126 figures, the mil 91 figures.

d.		Mils.
¼	——	1
½	——	2
¾	——	3
1	——	4
1¼	——	5
1½	——	6
1¾	——	7
2	——	8
2¼	——	9
2½	——	10
2¾	——	11
3	——	12
3¼	——	13
3½	——	14
3¾	——	15
4	——	16
4¼	——	17
4½	——	18
4¾	——	19
5	——	20
5¼	——	21
5½	——	22
5¾	——	23
6	——	24

d.		Mils.
6¼	——	25 half shilling.
6½	——	26
6¾	——	27
7	——	28
7¼	——	29
7½	——	30
7¾	——	31
8	——	32
8¼	——	33
8½	——	34
8¾	——	35
9	——	36
9¼	——	37
9½	——	38
9¾	——	39
10	——	40
10¼	——	41
10½	——	42
10¾	——	43
11	——	44
11¼	——	45
11½	——	46
11¾	——	47
12	——	48
		49
		50 shilling.

With regard to the number of figures used, it must be remembered that almost all retail accounts have to do with the fractions of a penny. Now beginning at a farthing and going up to a pound by gradations of a farthing requires 3880 figures, in vulgar fractions, written with difficulty, and applied with difficulty to any arithmetical rule; while the equivalents in mils require only 2685 figures, a difference in favour of the mils of 1195 figures, the mils being, at the same time, all in harmony with arithmetic.
Beginning at a penny, and going up to the pound by gradations of pence, under the present system. it requires 610 figures to express all the gradations; beginning at a mil, under the mil system, would only require 47 figures more.
The penny system destroys our whole system, and does not comprehend our wants.
With regard to conciseness of expression in words, taking the whole of the gradations of the present scale, beginning at the penny and going up to the pound by gradations of pence, requires 5342 letters; while to express the equivalent sums in pounds, florins, and mils requires only 5211 letters, a difference in favour of the mils of 131 letters. But if we went to farthings, how immensely might we swell this advantage.
Can there be a doubt, when the whole case is stated, as to which are the easiest to work with?

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It is the non-interchangeability of the coins at present in use with the money of accounts kept decimally that we complain of, and the reason why we want an alteration. That is our starting point. By keeping accounts in pence, you do not alter the money. We know that we might at any moment do that; but it would not give us a complete Decimal System unless we went down to the centime, a point too low for us, and involving too many figures.

We might keep our accounts in pence, and pay our debts and receive our credits in pounds and shillings, but no sane person would think of doing so. He keeps his accounts because he wants to know the value of what he possesses, what he has to pay, and what to receive, in the current coin of the realm; and he keeps them in the leading terms of the coinage.

The equivalent of 4*l.* 7*s.* is not £4·342 but £4·350; and if the column had been properly worked out it would have amounted to that sum. Now £4,350 is divisible, without remainder, by 2, 3, 5, 6, 10, 15, 30, 50, whole numbers. It is divisible besides by 4,350 different divisors without a fractional remainder.

No. 14 therefore falls to the ground. Beyond all question the superiority rests with the mils.

15. What commodity is there of the price of a pound a yard, or of the price of a pound a pound? Nothing of any consequence to any mortal man. The pound is only one price in one thousand prices in the scheme of mils.

The answer given in No. 10 might be considered sufficient; but this involves the whole pound, and is connected with the question of the limitation of its fractions to pence.

The 1,000 mils can be divided a thousand times without a remainder. They afford a thousand gradations of price.

The 960 farthings can be divided 960 times without a remainder, and afford 960 gradations of price.

The 240 pence can be divided 240 times without a remainder, and afford 240 gradations of price.

Of these gradations of price there are the following in the respective categories divisible by the prime numbers without a remainder:—

Number of Prices, which may be divided by	In the Mils.	In the Farthings.	In the Pence.
2	500	480	120
3	333	320	80
4	250	240	60
5	200	192	48
6	166	160	40
7	142	137	34
8	125	120	30
9	111	106	26
10	100	96	24
	1927	1851	462

All these prices and their divisions can be more easily paid by the mil system, more easily recorded, more easily dealt with by any arithmetical rule, and have this great advantage over all irregular quantities,—one which never for a moment ought to be lost sight of,—that they yield a per-centage without any arithmetical operation.

These considerations comprehend every objection which can be founded upon the non-divisibility of the integer.

The integer is but one price, and not a frequent one of anything divisible; and when that is said, there ought to be nothing more needed.

There is no force in No. 15. Its instances are garbled, and consequently worthless in the argument.

16. It is. By far the largest number of all calculations have to do with money; and we should then have at least one side of the question rational.

17. There is at present nothing homogeneous between them.

18. We have no binary system in our coinage; and I do not use the word here in a narrow or restricted sense. I maintain that it is not practically a binary system. In neither weights, measures, nor money, can you arrive at the integer, either by a binary or a duodecimal division.

Take the most favourable to this view, the avoirdupoise weight.

In the ton you cannot get down to the pound; you cannot get lower than thirty-five pounds.

In the pound, which is your strongest point, you cannot reach the integer by any possible division. You can go eight stages down to the dram. Let us see how that acts:—1 dram at 960 farthings a pound = $^1/_2$ $^2/_3$. So No. 18 starts with a fiction. See No. 10.

19. It will. This has been shown. See No. 15. The coinage in the mil scale would be more comprehensive, and would adjust a greater variety of debts. It affords more prices capable of division by the prime numbers.

20. See answer to No. 15.

21. All these questions hinge upon the supposition that a shilling a pound, a shilling a yard, a shilling a foot, are comparatively frequent prices; there never was a greater mistake.

See Answer No. 10.

22. No doubt it would, else there would be no reason for a change.

23. Nearly the whole of this is wrong. It is from no want of respect to Mr. Yates that I say this, because I know so much of his fairness, that I am sure none would be more ready to acknowledge this than himself.

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The United States have called in the coins mentioned here, and the reason does not apply with the mil system, the fractions of which are insignificant, while the half of a cent is nearly a whole farthing, a value too large to be lost.

I can neither admit the force nor the truth of it.

24. See answers to Nos. 6, 10, and 15.

Mr. Quincy Adams here does but describe the inconvenience which resulted to the United States from a hasty and inconsiderate introduction of a good thing in an unprepared season.

What they did, we wish above all things to avoid. Both in France and the United States they rushed wildly into decimal account-keeping, as some people would have us do here, without altering the coins so as to enable the people to pay their debts contracted in the new denomination.

They kept their old coins, and have only just now attempted to get rid of them.

25. The late Lord Ashburton does not make this argument a bit stronger. $7\frac{1}{2}d.$ a pound, or a yard, is a more frequent price than a shilling a pound, or a yard. See Nos. 10 and 15.

26. It is a great misfortune. They do not fit the present coinage, as no one knows better than Sir John Herschel. If they did we might multiply them one into the other without any difficulty. The only way I see at present of making them all perfectly homogeneous is to decimalize them all: but it is better to have the coinage decimalized than neither, because we can take parts for the weights and measures, and one side of the work at least will be congruous.

Ultimately it should do so; but so large a change, in so huge and complicated a machine as our trading system, which must be kept going, can only be made by minute, well-timed, and well-ordered changes, spread over a considerable time.

27. See the preceding.

I think the coinage should be dealt with first.

The next step, which could create no inconvenience to anyone worth a moment's consideration, would be to keep the accounts and to weigh all merchandize by pounds. See my paper on this subject.

28. If this case of 215 tons and so on werenot of a peculiar class of cases, and if this class lost any great convenience by the change, something might be urged against the change upon this point. There is a great deal of work in the first example not recorded; in the other it is quite straightforward and simple. I do not think much stress can be laid upon this.

29. They will be just in the same condition that they are at present.

See Nos. 6, 10, 15, and 23.

30. I should think it would be a great advantage, especially in working the stock account. However, I am not "a great practical authority," and I cannot say.

31. I do not see how it necessarily follows. A Decimal Coinage might make more evident to the country at large the advantages which would attend a change, and thus force it on. But should it not be found desirable, the Decimal Coinage could not force the country into a change.

32. If the thing be good in itself, do it for its own sake. It is all the better too, to do it, if you have the belief that it will be a step to a further good, which is not quite practicable without.

33. It is not; for reasons before stated in 26.

Unfortunately for the French their chief weight, the kilogramme, is more than two pounds, which is a very awkward unit. One pound is far better. In decimalizing it, we should still retain our half pounds and quarters, and the twentieth part, which would be 5 in the column of hundredths, would be a most convenient substitute for the ounce, under the name of quintin or quint.

At present the halves and quarters are the only binary divisions in general use as divisions; below that, recourse is had to the next category, ounces. Tenths and half tenths would be more convenient than eighths and sixteenths in fractional weights, and the system would be harmonious.

We should have, then, the only divisions now practically made use of as bisections.

34. The integers of our weights and measures are not divided by a binary scale. Below halves and quarters, divisions of the integers are not common.

35. The pound sterling, the shilling, and the penny, are three but very uncommon prices, as I have abundantly shewn.

You cannot pay for a quarter of a pound of rice at $3\frac{1}{2}$ a pound, or sugar at $7\frac{1}{2}$, or a thousand things at a thousand prices, such as we see in the grocer's shops every day we choose to look.

What is good for wholes is good for their parts. The pound, our standard coin, is such, because it is a convenient quantity to keep up to its weight; but it is not an integer with fractions, as I regard it, or as it grew up in history; it is an aggregation of integers.

I do not think it natural or convenient, and I do think I have proved the contrary.

36. See 23. There is nothing new here; there is not a point to found an argument upon.

37. I do not think there is anything in this question not answered before. We cannot abandon a duodecimal system, for we never had one. The extract from Mr. Quincy Adams suggests an impossibility.

38. They are some of the requirements; but of the integer it should have been said that it should be so small as not to require a fracture; and the most important is left out, that the coins of account should be in arithmetical relation to each other, so that a percentage might be taken without any arithmetical operation. A bisection is, no doubt, more easily made than any other section, but there does not appear to be any natural tendency to subdivide commodities by continual halving; a board, for instance, or a piece of cloth.

39. It is not a just description; and the observations that follow are not correct. See No. 15.

40. If by a "binary or duodecimal scale" is meant the present scale, then I answer it does not afford peculiar facilities for clear fractional parts. See No. 15.

41. We shall lose them in some cases, to gain them in more.

This question has been answered over and over again. See No. 15.

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42. That would not be to keep accounts of our coinage, and would be a monstrous piece of folly to attempt.

43. It could not be accomplished at all; the whole coinage must necessarily be changed to the denomination of the penny.

The thing is totally impracticable without giving up the present coinage, which is altogether out of the question.

44. The mil scheme as nearly as possible aims at that.

45 to 48. These have all been answered.

49. Certainly not.

Anybody may do it at present who chooses; but it would never be done except at the point of the bayonet.

50. No, the money would be all of one kind.

51. Yes. England has four.

52. Not of the least importance. If the coins be convenient, a thousand steps afford a most decided advantage.

53. They quote prices in vulgar fractions, as doubtless we should continue to do.

The half cent they bring into account in small dealings shows that the dollar is not sufficiently comprehensive.

It is not to be supposed that we should give up the use of vulgar fractions.

54. It does. At present we have 960.

55. The comparison will be very much to our advantage.

56. It is of great advantage. A large proportion of sums are for even pounds. It is this which would give in point of saving of figures to the pound and mil scheme the great advantage over the penny.

57. Certainly not, we have 960 parts at present, we shall then have 1,000; but we shall not be always thinking of the pound when we are laying out a florin.

The most advantageous conditions of a decimal coinage are when it embraces all the values proved by experience to be the most useful and necessary.

58. Answered before. There will be a greater number of clear fractional parts.

59. In such accounts it would be desirable to limit all sums to the five-mil piece, as it is now to the penny.

Upon the whole I think there would be no increase of figures.

60. A shilling is but one price. Forty-eight mils will do the same.

61. See No. 15. So far to the contrary, it will give the "lower classes," and all other classes, a larger number of prices divisible by 2, 3, 4, 8, and 16, and all other numbers besides.

62. It is just possible that noisy malignant people might seize the occasion of any sudden change, if such were attempted, to make themselves of importance; but it is to be hoped that if the change be made it will be by minute and well-understood steps. And when the contemplated change has undergone the ordeal of a Parliamentary discussion little need be feared from agitators.

63. A decimal system would be of far greater benefit to the artisan and middling classes than to the upper, except, perhaps, in the arithmetical part of the education of the women, who are sadly perplexed and disgusted by the complex and unintelligible rules of compound arithmetic.

64. I think the decimal coinage proposed will be best for all.

65. As some of the questions are many times repeated without involving any additional principle, I have thought it, in some cases, needless to do more than to refer to some general answer; but I have given to them all a careful and respectful attention. Such I have considered but due both to the subject and to Lord Overstone, who, in the spirit of fairness which characterises all his actions, has given them the advantage of his countenance and protection.

Bank of England, May 23, 1857. W. MILLER.

(*Communicated by Lord Overstone.*)

Rev. PETER THOMAS OUVRY.

Rev. P. T. Ouvry.

Answer to Question 1. Yes, so much change as to render simple arithmetic applicable to all money calculations.

2. Chiefly because it involves compound rules of arithmetic.

3. My objection is restricted to the inconvenience of our present coinage for the purposes of account-keeping and calculation.

4. For the convenient interchange of commodities. I do not consider them as fractional subdivisions of an integer; but as several distinct integers chosen larger or smaller, according to the magnitude of transactions; large dealings are transacted in multiples of pounds; smaller in multiples of shillings or pence. I consider that the relations of the several integers were adjusted after the integers themselves were chosen, and that no considerations of fractional subdivision entered into the matter at all. Though account-keeping and calculation be not their primary purpose, yet it is most desirable to choose a scale of coins which would facilitate this necessary object.

Rev. P. T. Ouvry.

5. The object of adjusting retail payments is entitled to priority, but there is no occasion that the other object should be sacrificed.

6. It is; small payments may be made in several different ways, with nearly equal convenience. There may be nothing to complain of in our present system of coinage in this respect, and yet a modified system more compatible with accounts and calculation may be equally free from complaint.

It is admitted that the use of the coinage is of first importance; the question is, whether the coinage may not be made consistent with simple arithmetic without injury to that use.

7. Yes; that is, I would so adjust the coinage as to reduce all accounts and calculations to simple arithmetic.

8. Ten has no doubt fewer divisors than twelve. I believe that our retail transactions are carried on by the multiplication of smaller integers, rather than the division of larger ones. Things cost so many pounds, or so many shillings, or so many pence, or so many farthings. Even when divisions of an integer are made, there is a tendency to give them a new integral name, rather than one showing the fraction of the larger integer. We prefer to say ten shillings rather than half a pound; and we never speak of a quarter pound, we say five shillings or a crown. So we say sixpence, or fourpence, or threepence, which are fractions of a shilling, but which are thought of as multiples of a penny. Even a halfpenny is more viewed as an integral coin than as half a penny; and a farthing is never thought of as a quarter penny. We should easily get into the habit of estimating values in pounds, florins, and cents; and I think they would be quite as convenient for all retail transactions as pounds, shillings, pence, and farthings.

9. If simple arithmetic founded on the number ten, be good for the astronomer and the computer, surely it is equally good for the people.

I do not see how the more numerous fractions of twelve than ten helps the customer and dealer; you use multiples of various integers rather than fractional parts.

The fallacy consists in the supposition that men make fractional parts of their money instead of reckoning it.

10. Yes, certainly, in that respect, from the nature of the case.

11. I think not; it is a matter of habit. When people become accustomed to simple arithmetic for all purposes they will greatly prefer it.

12. The examples given are chosen with reference to the present system; the only fair comparison would be of the whole of the cases which might arise.

When pounds, florins, and cents are substituted for pounds, shillings, pence, and farthings, retail transactions will be based on these new integers, and people will halve them and quarter them as they do now with the present integers if they want to do so; but practically they will price things in florins or cents, and I should say business would be transacted with greater facility.

Add together all the fractions of a quarter florin and a sixpence, 59 figures are used. on our present system, 44 on the proposed system:—

£ florin	cents.	£	s.	d.
	25			6
	24			$5\frac{3}{4}$
	23			$5\frac{1}{2}$
	22			$5\frac{1}{4}$
	21			5
	20			$4\frac{3}{4}$
	19			$4\frac{1}{2}$
	18			$4\frac{1}{4}$
	17			4
	16			$3\frac{3}{4}$
	15			$3\frac{1}{2}$
	14			$3\frac{1}{4}$
	13			3
	12			$2\frac{3}{4}$
	11			$2\frac{1}{2}$
	10			$2\frac{1}{4}$
	9			2
	8			$1\frac{3}{4}$
	7			$1\frac{1}{2}$
	6			$1\frac{1}{4}$
	5			1
	4			$\frac{3}{4}$
	3			$\frac{1}{2}$
	2			$\frac{1}{4}$
	1			
	325			63

13. I do not think the construction of a coinage is a matter of division; I believe it to be one of multiplication. See Answer 8.

I see nothing more really natural in one system than another, it is merely a matter of habit and custom. May not the integers of our present coinage be considered a fortuitous concurrence of integers rather than the result of deliberate choice?

14. This would go to prove that compound arithmetic is easier than simple arithmetic; most people would prefer simple arithmetic.

If the farthings were inserted the numbers would be in favour of the mil system; still more would this be the case if all the fractions of a pound were added in the two systems. The pence column should be reduced to farthings in order to enter into comparison.

If all the fractions of a pound were written the number of figures would be, under the present system of coinage - - - - - - - - 3948

If all the fractions of a pound were written down on the pound florin and cent system, the number of figures would be - - - - - - - 2893

15. This question puts forward the advantages of a duodecimal notation over a decimal one; but notwithstanding it seems more advisable to alter the coinage than to alter the arithmetic. The facts stated cannot be gainsayed; nevertheless, the only fair comparison between the £. *s. d.* and farthing system, and the £. florin, and cent system, as to number of figures used, is to write down all the gradations from one farthing to a pound, and from one cent to a pound, and then it will be seen, as I have stated in the last answer, that the present system would require 3948 figures, the £, florin, and cent system only 2893.

III.

16. Our weights and measures want revision more than the coinage. They might be very much simplified and made to fit with the pound, florin, and cent coinage sufficiently.

17. No, it cannot.

18. It requires much latitude of consideration to imagine our weights and measures binary. Almost every possible system of notation is found in them, and often the same nominal weight is different for different purposes and in different places. There should be one pound to weigh everything, and 100lbs. should be a hundredweight.

In long measure there should be only miles, yards, feet, inches, and tenths.

We are so used to variety of measures of capacity that no expedient alteration would be found inconvenient.

19. I think there would be little difference; our coinage does not measure our weights and measures now; we should be no worse off under a Decimal System.

20. I think not. We reckon prices by multiplication of integers not by division. In the cases put the florin and cent system would adapt themselves to halves and quarters. If an article were a shilling a pound, an ounce would be sold at some different rate founded on a lower integer and not on the fraction of a shilling. Sixteen ounces of tea, for instance, are not sold at the same proportional price that a pound would be. I do not know of anything usually sold in inches, except butter at Cambridge; and as butter varies from 10*d.* to 20*d.* a pound; there is no particular facility in the duodecimal basis more than in the decimal.

21. Not in the particular case put. An ounce is not generally the sixteenth of an article at a shilling the pound. An article at 1*s.* the pound would probably be sold at 1*d.* the ounce. Small quantities are adapted to the small integers rather than to the fractions of larger ones. The use of cents in small retail transactions rising as they do from one to a hundred, would probably facilitate business and cause purchasers to get better value for their money than they now do.

22. Yes, in every one, on the whole.

23. Our system of weights and measures is so exceedingly irregular, that a judicious alteration would be generally acceptable; and I believe such alteration might be made as would allow of the use of simple arithmetic in all calculations, which would be an immense advantage.

I should say 1,000 has more divisions than 960, not so many different divisions, but more of the smallest integer, which would be the basis of small retail prices, so that small purchasers would be gainers instead of losers.

24. I do not think people use thirds, eighths, or twelfths in retail transactions. After the quarter they calculate on some lower integer on a scale of prices higher than those charged on the higher integer scale. Mr. Adams says that the Decimal System, as applicable to coins, is inadequate and in some respects inconvenient. The only inconvenience he mentions is its incompatibility with $\frac{1}{8}$th and $\frac{1}{16}$th, which are not represented in our coinage now.

25. Lord Ashburton's remark is quite correct. Under a Decimal System we may halve and quarter the integers, but not more. If the inability to carry the binary division beyond the quarter is inconvenient it must be balanced against the other advantages of simple arithmetic.

26. Sir J. Herschell's expression amounts to this, that we have got into habits inconsistent with the Decimal System, which he considers a misfortune. Why not change a bad habit? I should certainly concur with his further observation.

27. I think Mr. Airy's view most correct.

It is very desirable that the division of weights and measures should fit the divisions of the coins, but it is not essential.

It would be best for all to be done at once.

28. This shows the desirableness of introducing simple arithmetic into our weights and measures system to the greatest practicable extent.

29. I think it would not make weights and measures more inconvenient than they are; it would tend to the introduction of simple arithmetic into the weights and measures, which is very desirable.

30. It will, so far.

31. Yes.

32. The natural and proper course is that which is most convenient and practicable.

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33. A duodecimal scale has undoubtedly some advantages over a decimal one. If our arithmetic were duodecimal, no one would think of making either coins or weights and measures decimal ; but simple arithmetic being decimal, the balance of advantage seems to me with making coins and weights and measures so.

No doubt, when there are advantages and disadvantages on either side, there will be difference of opinion as to the balance. As a matter of fact, the most advanced nations have introduced the Decimal System without difficulty.

IV.

34. Too much weight is given, I think, to the tendency to subdivide. I believe subdivisions beyond the half and quarter are generally made in the units of the next lower integer ; and we betake ourselves to multiplication as soon as we can. We speak much more of feet than half and quarters of yards, and of inches than half-feet.

35. We speak of ten pounds, one hundred pounds, &c., and we also speak of ten shillings, rather than half a sovereign. In ninety-nine cases out of a hundred, I believe, in asking the price of an article worth half a pound, the answer would be ten shillings ; and a quarter pound is never mentioned ; it is either a crown, a new integer, or five shillings, a multiple of a new integer. In like manner the subdivisions of a shilling are always a definite number of a new integer, pence ; no one says that an article is worth a half-shilling or a quarter-shilling. This habit of using definite numbers of fresh integers of lower amount would facilitate the change to a decimal notation. The multiples of cents would be very convenient.

36. The Decimal System admits of the shilling and the sixpence, that is, the half and quarter florin. Do we now use thirds, eighths, twelfths, or sixteenths? I do not see that these small differences would arise. We should do then as we do now. The price of an ounce is not the sixteenth of the price of a pound. You get the pound, half pound, and quarter pound at the same rate ; but ounces are usually sold at a higher rate. Take tea at 2 florins or 4 shillings the pound ; you would get half a pound for a florin, and a quarter pound for a half-florin or shilling ; but if you wanted an ounce of the same quality of tea you would probably be charged fourpence for it, a price not calculated on the fraction of the price of a pound at all. The tradesman will make his own bargain ; the purchasers of small quantities now pay a higher relative price ; it would be the same under the new system. Small articles would be priced in cents, and the fractional part of the larger integer would not enter into the calculation.

The loss from purchasing very small quantities now falls on the purchaser ; the use of cents would, I think, help him rather than otherwise, there being now an indisposition to split a penny, though an article may not be worth so much.

The price of bread, for instance, rises or falls by halfpence ; it is 6*d.*, or 6½*d.*, or 7*d.*, or 7½*d.* per 4 lb. loaf ; under the new system it would be 24, or 26, or 28, or 30 cents, which would be quite as convenient.

The difficulty of subdivision pointed out is entirely met by the prices of all small articles being based on the integer of the cent.

The true price of commodities is just as likely to be 17*d.* or 13*d.* or 11*d.* or 7*d.* as a divisible number of pence, so that I do not see the inconvenience of pricing things in cents, which would allow a greater conformity to the true price from being a smaller denomination. Are not things now often priced at a shilling, not because they are worth a shilling, but because of its being an integer ? The habit of pricing in cents would lead to fairer dealing and greater economy, besides the advantage of simple arithmetic.

37. Nevertheless Canada has adopted a Decimal Coinage. I admit a combination of the two systems is the best, and such a combination I believe to be practicable.

38. (1.) The integers of a coinage should be divisible into halves and quarters ; nevertheless, the units of the next lower integer are practically used more than those halves and quarters. We use shillings and pence, not half and quarter pounds, or half and quarter shillings.

(2.) Exchange is more a matter of multiplication of integers chosen smaller and smaller, according to circumstances; fractions are not popular. So that the relations of the several integers are well understood I do not think it matters much about their fractional parts. We use pence and shillings, and we know how many pence make a shilling, and how many shillings make a pound ; it would be the same with cents and florins.

(3.) Nothing can be more inconvenient than to count a heap of coins, consisting, as now, of halfcrowns, florins, shillings, sixpences, fourpences and threepences ; a heap of florins, half-florins, or shillings, quarter-florins or sixpences, and one other new silver coin of 10 cents, would be far easier to count.

(4.) Mental arithmetic is independent of any particular system of coinage, I believe, and depends a good deal on a number of standard results of calculation being stored in the memory like an extended multiplication table. Whether a Decimal System is preferable or not on this ground I do not know.

(5.) Is there any such tendency to divide beyond the half and quarter ?

39. The account of the factors of the integers of our present coinage is quite correct.

It would be equally correct to say that—

A pound consists of twenty shillings;
A shilling „ twelve pence ;
A penny „ four farthings.

And I think that a system in which—

A pound would consist of ten florins.
A florin „ one hundred cents,

would be quite as convenient for exchanges, and more so for calculation.

Does the history of our coinage show that it was a system ever deliberately adopted ? Did not the several integers grow up independently, and were adjusted afterwards to each other ?

40. The Duodecimal System is more divisible than the Decimal; but any advantages thence arising are more than counterbalanced by the inconveniences of a double notation.

41. There will be the difference between decimals and duodecimals in that respect, so far as shillings are concerned, or, rather, between dividing the pound into 1000 and 960.

42. With as little change as possible. I do not think it can be done without some change. We have, however, already made the most important change by the introduction of the florin.

43. To keep accounts in pence would be very inconvenient. The plan would not show on inspection the numbers of the two higher integers, which is a fatal objection. I should prefer the florin and cent to the dollar and cent.

Rather than Mr. Snowden's suggestion I would make the crown into the dollar, and then the scale would be,—

		cents.		£	s.	d.
4 dollars	=	400	=	1	0	0
1 dollar	=	100	=	0	5	0
½ dollar	=	50	=	0	2	6
¼ dollar	=	25	=	0	1	3
		20	=	0	1	0
		10	=	0	0	6

44. It does.

45. Yes, but admitting coins of the exact value of our present sixpence and shilling.

Yes; but in the penny scheme we lose sight of the pound in accounts.

The omission of everything under a penny makes accounts more simple; but the farthings ought not to be left out.

It is an advantage of the pound and mil system that accounts would be more complete.

If it were desirable to make the penny the lowest integer in a Decimal System, it might be convenient to retain halfpence and farthings; but I do not think the penny system fit to be introduced from its omitting to show the number of pounds in accounts on inspection.

If we had florins and cents we might, too, have half and quarter cents.

46. One pound = 240 pence. I do not see how the two could be used together decimally.

47. I think it is inconvenient to write fractions; but it certainly is not inconsistent with a Decimal Coinage that some persons should choose to use in their accounts a binary division of the lowest integer.

48. The penny, in my judgment, should be kept as a coin, and be worth four cents or farthings, which would diminish its value four per cent. It would not, however, be an integer of account. I do not see that the omission of the fractions of a penny is an argument for the advantage of a system. The fractions of a penny ought not to be omitted; the pound, florin, and cent system would be more complete.

49. Yes; all that is required is to make 50 farthings equal to a shilling instead of 48, leaving the penny very slightly altered in value.

Some of our coined pence now weigh sixteen to the pound, others twelve, so that their intrinsic value is not represented by them. I have seen a practical suggestion to make the rimmed pennies worth five farthings, the lighter ones four, which would, I think, be a good plan.

It would be troublesome to keep accounts in pence. The account would not show the number of pounds, a fatal objection in my judgment.

50. I should propose the pound, florin, and cent., which might be written as florins and cents only, but I see no difficulty in accounts being kept thus:—

£	fl.	c.
46	7	45
314	6	32

51. I don't know.

52. Such is the case with florins and cents, though I don't see the difficulty of keeping the pounds separate.

53. Florin and cent are as good as franc and cent, dollar and cent, and have the great advantage of not interfering with our pound either as a coin or in account.

The inference is that florin and cent should be preferred for our money of account. It does not follow because four moneys of account, stopping at a coin of so small value as a dollar, was found inconvenient, that the pound, florin, and cent should be so. To express fractions of cents fractionally will not interfere with the Decimal System.

Most persons would find any change inconvenient. I believe many arguments were used a few years ago only to prove that it was easier to keep accounts by cutting notches in a stick than by writing figures in a book.

The statement from the "Times" shows existing habits. Would it not be just as easy to quote changes of price in tenths?

So are different measures in our markets now quoted in opposition to the imperial bushel.

When decimal notation, as applied to coins, weights, and measures, is taught in our schools, it will, I should think, become an established habit to use it. Many of the present generation will assuredly refuse to change their old habits. Men are not given to change even for the sake of improvement. Most persons, I suppose, would answer these questions summarily, by replying to the first question, No.

54. Pound, florin, and cent is as easy as pound, shilling, pence, and farthings. If more desirable, florins and cents might alone be used in account, though I cannot see the inconvenience of a pound column.

55. We are speaking of a Decimal Coinage in this country. It may be a question whether uniformity of coinage throughout the world is desirable; uniformity of weights and measures throughout the world certainly is. I think the pound, florin, and cent system is best for us, looking to what is at present. A different system consisting of two moneys of account may be better in itself, but any change in this country should preserve the pound, shilling, sixpence, penny, and farthing, which should be adjusted by the trifling alteration of four per cent. in the value of the penny to a decimal notation, so that 1,000 farthings equal the pound.

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56. It is so convenient and advantageous that I would keep it in our accounts.

57. No, I think not.

If you keep accounts in florins and cents you have only 100 steps, and by cutting off the florin unit you show the pounds.

florins.	cents.	£	fl.	c.
478,346	27	47,834	6	27

One way is just as convenient as the other. We have now four monies of account and three scales of notation.

58. 1,000 has fewer different divisors than 960. But the simple arithmetic arising from making 1,000 farthings equal the pound renders the balance of advantage in its favour.

59. They are, but surely they ought not to be. A Decimal System will remedy this defect.

I don't see how it can be argued as an advantage that part of an account is left out for the sake of convenience. A complete account is the best. For all items of account in which shillings are expressed by two figures the number of figures in the two accounts would be the same; though one is complete, the other omits the fractions of a penny. There would be one more figure in each item in the decimal accounts when now the shillings are expressed by one figure.

s.	*d.*		
17	6	=	8·75
9	6	=	4·75
13	$7\frac{3}{4}$	=	6·82
4	$2\frac{1}{2}$	=	2·10

60. This inconvenience must be submitted to.

61. Do the lower classes divide by 8 or 16? They may have $\frac{1}{2}$ or $\frac{1}{4}$ under the Decimal System. A man who can readily divide a thing into 3, 6, or 12 parts would as easily divide it into 10 or 5. Yet the Decimal System was adopted in preference.

62. It slightly alters the penny and the farthing; wages are paid in shillings, which would not be altered in value. Would not the people look favourably on the change, inasmuch as they would get 50 farthings for their shilling instead of 48.

I think alteration of the pound, in order to keep the farthing intact, quite out of the question. I do not think the alteration in the farthing would produce any inconvenience whatever.

63. I think the advantage will be to all classes, and very particularly to school children.

64. I think our weights and measures want simplification more than our coinage. If the adoption of a Decimal System seriously interfered with the convenience of the mass of the people it ought not to be adopted.

65. The advantages mentioned outweigh the disadvantages.

I think the change may be made prudently, with certainty of result, with increased convenience, and that no material disturbance of our present system, or injurious interference with our habits, is necessarily involved.

A comparison of our present scale of coinage with a new one proposed as most practical and convenient.

The Names of our present Coins.	Their Value in Florins and Cents.		The Names of the new Coins proposed.	Remarks.
	fl.	c.		
Sovereign	10	0	Sovereign.	
Half-sovereign	5	0	Half-sovereign.	
Crown	—		—	To be dropped.
Half-crown	—		—	To be dropped.
Florin	1	0	Florin.	
Shilling	0	50	Half-florin.	
Sixpence	0	25	Quarter-florin.	
Fourpence	—		—	To be dropped.
Threepence	—		—	To be dropped.
		10	Ten-cent piece.	A new silver coin.
		5	Five-cent piece.	Our present rimmed 12 to the lb. penny.
Penny	0	4	Penny	Altered 4 per cent.
Halfpenny	0	2	Halfpenny.	
Farthing	0	1	Farthing	1,000 to a pound.

The only actual new coin would be the ten-cent piece, which would be easily distinguishabl from the quarter-florin, and not produce the difficulty of counting now caused by our threepenny and fourpenny pieces.

PETER THOMAS OUVRY.

(*Communicated by Lord Monteagle.*)

ANSWERS to such of the QUESTIONS contained in LORD OVERSTONE'S Paper as are numbered with the same numbers entered in the Margin hereof.

JOHN PATERSON, Albany, U.S.

John Paterson, Albany, U.S.

Answer to Question 8. The number $12 = 2^2 \cdot 3$ has no more prime factors than the number $10 = 2 \cdot 5$, although the former has four divisions (2, 3, 4, 6,) while the latter has but two (2,5). But then the only fractional parts of the shilling that have been coined are the half (sixpence) and the third (the groat); and I believe the latter is now very little in use. (MEM.—The writer was not aware of the threepenny piece.) The crown (five shillings), itself unsusceptible of any clear fractional division, and I believe also the halfcrown (the fractional $2\frac{1}{2}$ shillings), have long held a place in the regular coinage. Until the latter part of George the Third's reign the standard unit, the pound, had no coined existence; and then what is the number 20 but the double of 10, the basis of the Decimal System of which the crown is the half? If the pound sterling be adhered to as the British monetary standard unit, the Decimal System can be introduced with very little disturbance to the coinage. Suppose we write,—

1. The Gold Coinage:

	s.
1 pond (pound or sovereign) equivalent to the present	20
$\frac{1}{2}$ pond (= 5 solls, or florins)	
$\frac{1}{4}$ pond (= $2\frac{1}{2}$ solls)	
2 pond	40
3 pond	60

This would certainly answer every convenient and useful purpose of a gold coinage.

2. The Silver Coinage:

	s.	
1 soll ($\frac{1}{10}$ of the pond) equivalent to the present florin, or	2	
$\frac{1}{2}$ soll (= 5 penns)	1	
$\frac{1}{4}$ soll (= $2\frac{1}{2}$ penns)		6*d.*
2 solls	4	
3 solls	6	

This would give a sufficiency of silver pieces, and involves no serious departure from the present system of coinage.

3. German Silver Coinage:

1 penn ($\frac{1}{10}$ of the soll) equal to	2·4 pence.
$\frac{1}{2}$ penn (= 5 mills) „	1·2 „
$\frac{1}{4}$ penn (= $2\frac{1}{2}$ mills) „	0·6 „
2 penns	4·8 „

4. Copper Coinage:

1 mill ($\frac{1}{10}$ of the penn) equal to	0·96 farthing.
2 mills	1·92 „
3 mills	2·88 „

The two last divisions do depart from the present system of coinage; but, if once introduced, would they not be equally convenient in retail business as are the pieces at present in use?

Whatever be the unit that is convenient in practice, take its half and its quarter, and then its tenth part (instead of its eighth) for a new unit, to be again divided in a similar manner; also the double and treble of the unit will generally be found convenient.

By adopting this method of subdivision the advantages of the Decimal System in calculation are combined with those of the binary system (as far as this system is indispensable) in the practice of actual admeasurement and the adjustment of payments in business.

In answer to the second question of No. 8, therefore, I do not consider indivisibility by the number 3 to be an objection to the use of the Decimal System in business transactions. Retail customers frequently call for the half or the quarter of some unit denomination of an article, but scarcely ever for the third part or even the eighth. In the latter case, instead of the eighth part, some new denominational unit usually appears, and this might be the tenth with equal convenience as the eighth.

10. It is believed that if the preceding graduated scale of coinage be examined and compared with one deduced from the radix 12, no particular advantage will be found to attach to the latter; but, on the contrary, the former offers some variety in pieces that may become useful. For instance, in the duodecimal system the half and quarter of the shilling are respectively sixpence and threepence; but in the Decimal System we should have the $\frac{1}{2}$ soll = 5 penns; the $\frac{1}{4}$ soll = $2\frac{1}{2}$ penns, and also the dipenn = 2 penns, and tripenn = 3 penns, if need be, and similarly with respect to each of the other denominational units. As the pieces 2 penn and 3 penn would be of German silver and the $\frac{1}{4}$ soll of common silver, difference in size is alone sufficient to protect against mistakes in the handling—a remark which applies at the same time to the 2-soll and 3-soll pieces of silver compared with the $\frac{1}{4}$ pond (= $2\frac{1}{2}$ soll) of gold, &c.

13. The most perfect radix would be composed of the product of the first three prime numbers, 2, 3, 5 = 30, which in fact constitutes the scale used by astronomers. This scale would require thirty separate arithmetical characters, the same number of characters requisite to constitute a philosophical alphabet; but this radix, although so satisfactory in theory, would prove to be entirely unwieldy in arithmetical practice, and we must therefore resort to one of lower dimensions. The first one that offers is the senary 2,3 = 6, of which the duodecimal scale is only a complication, formed by introducing no new factor, but merely by uselessly repeating the factor 2. The senary scale, requiring but six characters, on account of the great number of repetitions of figures that it introduces into the result of operations of any considerable extent, becomes exceedingly inconvenient in arithmetical practice. Then, since we can retain but two of the three prime factors 2, 3, 5, in a manageable scale, we are referred to the radix 2,5 = 10 as the most suitable choice. And although the number 10 lacks the property of divisibility by 3, it

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possesses the equally advantageous and beautiful property, that $10 - 1 = 3^2$, while, on the other hand, $12 - 1 = 11$, an inconvenient prime, which calculates better when referred as $10 + 1$ to the established radix.

The second clause of No. 13 is already considered in the remarks on No. 10. I do not know that inorganic substances are more accessible to duodecimal than to decimal division, but in several departments of organic nature the quinary combination prevails extensively.

16. It is admitted here that the use of the Decimal System of coinage in the United States has been acceptable from the time of its first introduction, and is found to be more convenient than the less congruous system of England, which is slowly disappearing from among us, while as yet there is no serious thought of departing from the English denominations of weights and measures.

17. As commodities are weighed or measured either in multiples of unit denominations or the submultiples of half or quarter, and then for a less quantity resorting to an inferior denominational unit, as stated in reply to No. 8, it would seem that the system of coinage there detailed would exactly fulfil the condition of perfect commensurability of denomination between money and commodity so far as relates to the principal standard unit of any particular weight or measure. With the subsidiary units incommensurability would in general appear and give rise to discrepancy; but the minor difficulties thus occasioned could as easily be surmounted in Europe as in America.

18. An experience of half a century says that the people of the United States find it convenient to use the Decimal Coinage without any alteration in the system of weights and measures.

19. The British quarter = 28 pounds, involves the factor 7, which is incommensurable with both duodecimal and decimal scales, so that a change from the former to the latter scale in this instance would only substitute one incommensurability for another, leaving no particular advantage either way. But a result of daily experience in this country may here be mentioned to obviate a possible introduction of fractional quarter-units of weight, measure, or coin. It is quite customary in retail business to sell certain commodities, as flour, sugar, &c., in quantities of 14 pounds, or its half = 7 pounds, and of its fourth part = $3\frac{1}{2}$ pounds (a fractional quarter), the price being regulated upon that of 14 or of 7 pounds, and no inconvenience found in the practice; but the binary subdivision is carried no farther, and the next resort is to one pound, the seventh part of the quantitative unit, from which the subdivision really commenced. The American system of coinage has to suit the very convenience of the public actually fallen into the method of subdivision here advocated. In gold we coin the eagle = 10 dollars, the half-eagle, and the quarter-eagle = $2\frac{1}{2}$ dollars, and even the tenth or one dollar, as also the double eagle equal to 20 dollars;—in silver, the dollar, half dollar, and quarter dollar = $2\frac{1}{2}$ dimes; also the dime and half-dime = 5 cents, and also the three-cent piece; and in copper the cent and half cent, the subdivisions being always in the order of unit, half, quarter, and tenth, while the multiples may be two or three. In addition to this evidence in favour of the convenience of the system may be adduced the example of bank issues, the bills of which are almost confined to the denominations of 1, 2, 3, 5, and 10 dollars, with no attempt to follow the order of binary multiples.

In linear measure the Duodecimal System has, perhaps, its strongest foothold, the yard being a multiple of the foot by 3, and one quarter of a foot being a whole number—3—of inches. Yet, notwithstanding this exemption from fractional divisibility, the engineers and accountants of the public and other extensive works in this State, consulting their own convenience alone, and adopting the foot as the standard unit of lineal measure, have very generally resorted to its decimal subdivision, carrying the records down to tenths (and not inches or twelfths) and hundredths of the foot.

Then, although the Decimal System may not offer any peculiar facilities in the retail transactions quoted in No. 19, it does not appear that the Duodecimal System has any other advantage but that of possession of the field.

30. I think that articles made up in parcels of ten will be quite as easily managed as if they were put up in dozens, and that class of society (if any such does still exist), which do their counting by means of their fingers, would evidently find their facilities increased thereby. And as it is quite as natural to begin with a simple unit and ascend in quantity by multiples as it is to assume a compound unit and proceed by subdivision, the ascending reduction or direct process may take the steps 1, 2, 3, 5, and 10, from which would rationally follow the inverse process or descending reduction by the steps 10, 5, 2, and 1, or else 10, $5 = \frac{1}{2}$, $2\frac{1}{2} = \frac{1}{4}$, and $1 = \frac{1}{10}$.

31. The adoption of the Decimal Coinage has not forced this country into the use of Decimal Weights and Measures, although it has called the attention of scientific men to the propriety of such a change, as soon as a community of nations shall agree upon the details.

34. If the Binary and Denary Systems are combined, as is here recommended, the queries in this number will be answered.

36. After reading this long paragraph, suppose a customer to call for the third of a pound of tea at 7*s.* 7*d.* the lb., what quantity shall the grocer weigh out? and what shall the customer pay for it? The weight must be 5 ozs. and $5\frac{1}{3}$ drams, which costs two shillings and sixpence and $1\frac{1}{3}$ farthing, and there exists neither weights nor coins capable to consummate this simple transaction. Or take a yet simpler case, which might readily be supposed to occur:—One-third of a pound of sugar is required at the rate of fivepence per pound,—it costs one penny and $2\frac{2}{3}$ farthings. If similar applications are not frequent, nor even occasional, it is a proof that, notwithstanding the use of the Duodecimal System of Coinage, third parts of any units whatever of weight or measure are not in demand in this community.

The ternary partition of quantity not being required for convenience, the difficulty of adjusting integral quantities and payments falls wholly upon binary subdivisions. Now, upon the fundamental principle that both labour and material are to be paid for, the retailer, when subdividing commodities into parcels less than fourths, is authorized, and also sanctioned by universal custom, to charge for such parcels at a higher rate than for that of the undivided quantity. A customer ought not to demand one ounce for $\frac{1}{16}$th of the price of a pound.

John Paterson, Albany, U.S.

As to the remarks of the Canadian Legislative Report, that the people of the United States and Canada have for sixty years clung to the use of the eight-shilling division of the dollar, they are applicable only so far as the influence of the State of New York extends, for in the New England States the dollar is six shillings, in Pennsylvania it is seven shillings and sixpence, in the Southern States six shillings and sixpence, while in the legal currency of Nova Scotia and Canada it is five shillings, and in England no silver was coined into a multiple of two shillings, but, on the contrary, there appeared the crown of five shillings, and its half = $2\frac{1}{2}$ shillings.

37. A coinage graduated according to units, halves, and quarters, and to multiples by 2, 3, 5, and 10, it is believed would, in connexion with the principles of retail transactions above referred to, be found to meet the exigencies of small trafficking, with facilities equally as great as are now obtained under the Duodecimal System.

39. See No. 36. I have tried to show that the number 3 is very seldom required as a divisor, either of quantities purchased or of money paid, but as a multiple this number does come into frequent use, and the Decimal System is no hindrance to its application.

40. The number 12 is oftener divisible than 10, but not by more factors, but the Duodecimal System has all the advantage of being divisible into five clean fractional parts, while the Decimal System is susceptible of only three. But when all is taken into account, the shilling in coinage, the pound troy in weight, and the foot in linear measure, are the only quantities now divided duodecimally, while the utmost extent of irregular division obtains throughout the entire system of weights and measures and coins. The advantage of the Duodecimal System is, therefore, now but partial, and an attempt to make it supersede the Decimal System entirely would produce more disturbance and result in fewer benefits than a resort at once to the Decimal System complete.

49. By the method offered in No. 8, the inferior coinage of pence and farthings is all that would be disturbed. To leave the penny as it is, and count in pounds and pence only, would overstrain the method as used by dollars and cents; the transition from the pound, as the unit or base of the system, to its 240th part, producing too great an accumulation of figures in a column, and thus tending to beget an aversion to a subsequent resort to the Decimal System.

50. The preceding objections apply still more forcibly to the scheme of pounds and mils, although the relation of unity to its one thousandth part is more readily apprehended than that of 1 to 960, the ratio of the pound to the present farthing. But when accounts are kept in dollars, dimes, cents, and mils, or in pounds, sols, penns, and mils, columnar inconvenience is the very difficulty that is completely avoided. All the four denominations are theoretically necessary though the first three (or in reality the first and third) of the former scheme are practically in use in this country.

51. I do not know, but for some time past I have observed some such tendency in English practice. For instance, new novels in three volumes are now generally advertised at the price of 31*s.* 6*d.*, instead of £1 11*s.* 6*d.*, as formerly. The expressions eighteenpence, twentypence, &c., instead of one shilling and sixpence, one shilling and eightpence, &c., are also frequently met with; and although accounts have not been kept in pence, it is quite probable that they would be in one or both forms, as well as in that of pounds, if the attempt were made to restrict ordinary calculations to the two denominations of pounds and mils.

53. On account of the smallness of value of anything less than a quarter of a cent it is generally neglected, and then the vulgar fractions $\frac{3}{4}$, $\frac{2}{3}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, of a cent being simpler than their corresponding decimals, have, for that reason, been preferred, but the precedent was bad, from the English division of the penny into $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$. Thus the sum of £19 17*s.* $3\frac{1}{4}$*d.* would be decimally expressed, approximately, either by 19 ponds, 8 solls, $6\frac{1}{2}$ penns, or by 19 ponds and $86\frac{1}{2}$ penns, the last expression having the advantage in point of simplicity of notation, the former in facility of apprehension. But as one mil is in value nearly equal to one farthing, the preceding approximation is not sufficiently close to the truth. If, instead of the pound sterling, the pond were made ten shillings as the base of the system, the soll would be the present shilling, the coinage would be disturbed no farther than it is already proposed to do, and the degree of approximation would be sufficient. But as there is an attachment to the pound as the grand national standard monetary unit, perhaps the most satisfactory of all modes would be to continue the writing of accounts in three columns, but modified so as that the preceding sum of £19 17*s.* $3\frac{1}{4}$*d.* = £19·86354165 will read 19 ponds, 8 solls, and $63\frac{1}{2}$ mils. In this way the example of No. 43 will appear.

£	*s.*	*d.*		£	*s.*	*m.*
1			=	1		
	6	8	=		$3\cdot33\frac{1}{3}$	
	5	0	=		2·50	
	3	4	=		$1\cdot66\frac{2}{3}$	
	2	6	=		1·25	
	1	3	=		$62\frac{1}{2}$	
£1	18	9		£1	$9\cdot37\frac{1}{2}$	

[Mem.—The foregoing answers, drawn up by John Paterson, of the city of Albany, in the State of New York, were transmitted by J. B. Plumb, Esq., an eminent banker of Albany, to Chief Justice Draper, who received them to-day, and transmits the foregoing copy to Lord Monteagle, in fulfilment of his promise to that effect.—29 June 1857.]

(*Communicated by Lord Monteagle.*)

Very Rev. Dr. Peacock, Dean of Ely.

The Very Rev. the DEAN of ELY, Lowndean Professor of Astronomy in the University of Cambridge.

Answer to Question 1.—Yes.

2. Its want of conformity to our system of numeration.

3. On both accounts. The existing system presents the residual units below the £ in the descending scale only, requiring a tedious arithmetical process to reduce them either to the decimal scale (which so many processes require) or to a multiple of the lowest subordinate unit involved. The other presents the whole simultaneously.

4. For both purposes; but more especially the latter. The subdivision of the materials of retail trade will readily adjust itself to the existing coinage, whatever it is, in spite of temporary inconveniences. Nothing is so certain as acquiescence in a new coinage, if proper means are taken to introduce it.

5. The second; but I believe the decimal will be found practically as convenient as our existing system, even for the purposes of retail trade, notwithstanding the superior divisibility of the shilling and the penny; the relations of its members will be more promptly and clearly perceived, and no reductions be necessary. In fact, we think in decimals. I formerly entertained and expressed a different opinion, but I had not then paid much attention to the subject.

6. There are many advantages attendant upon the calculations, in retail trade, being made in multiples of the smaller units of the coinage, instead of subdivisions of the large ones. This can hardly be done with our farthings or even our pence, in consequence of the difficult reductions which they require. In France, America, and Portugal, where the centesimal or millesimal system of coins are used, retail transactions are nearly all conducted by multiples.

8. Admitted; but the objection is more than compensated.

9. Napoleon was a very powerful but a very inaccurate thinker; but in the passage from which this quotation is taken, he has expressed, with singular precision and force, the causes which opposed, in the first instance, the introduction of the new metrical system in France. It seems to me unquestionable that the decimal scale of coinage presents a much more precise and clear conception to the mind, of the relation of its members than any other. This argument should be reversed.

12. The examples referred to in this and some subsequent queries are not fair, and the argument founded upon them seems to involve a partial misconception of the real points at issue. The values of one system admit not generally of accurate translation into another, and when the Decimal System is established such conversions would never be required. Addition is one only of many operations required in retail trade, and examples are not wanting where the advantage thus pleaded is reversed. Thus—

s.	*d.*	Mils.
11	7½	585
9	11¾	499
17	10¼	893
10	4¾	520
£2	9 10¼	£2 | 497

There are 27 figures in one and 16 in the other.

If the Decimal System was adopted, all the examples given in this No. would require to be taken in a reverse order.

The relative convenience of the two systems is not to be tested by such examples. If small fractions of a pound or any other concrete unit were used the process would generally be reversed. We should start from an inferior unit and proceed by its multiples, a process which is more comprehensive and rapid than proceeding by successive subdivisions; few shopkeepers would bisect more than twice, rarely more than once.

13. Admitted; but this is the only objection. What is its practical value?

Not necessarily so; it is rather cumulative than divisional.

Mr. Adams should have omitted numeration and multiplication; with respect to them there can be no question.

14. I think the reverse may be easily proved with respect to Nos. 1, 2, 3, and 5; if there is any advantage in No. 4 it is only from its requiring longer time and more precise subdivisions by lines or commas. With respect to No. 6, the necessity for the conversion ceases altogether when the Decimal System is once in operation.

15. Trade has little or nothing to do with such subdivisions of the £1; they are absolutely immaterial.

16. Yes, with reference both to the existing and proposed systems. A decimal metrical system would be the most convenient as superseding reductions and presenting quantities in a form at once adapted to decimal arithmetic and the application of logarithms. This last consideration is of the highest importance.

17. There is no necessary connection between them, though great advantages would result from such a connection when our mixed or concrete numbers are reduced to multiples of the lowest of their subordinate units, and the adjustment is made. The advantage of the adoption of a general system consists chiefly in superseding all such reductions.

18. Very partially so. Our present system of coinage cannot properly be considered as binary. The Spanish piece of eight, adopted by the Americans as their primary unit of coinage, was a proper basis of a binary coinage, but the Americans decimalized it.

Very Rev. Dr. Peacock, Dean of Ely.

19. Why do our engineers and surveyors decimalize their measures, the foot rule included, whereon extensive calculations, involving price and measures of quantity are concerned? Does not this practice originate in the sense of the violence done to our arithmetical associations by the use of multiples or submultiples of concrete units, which are not decimal?

20. By no means; the values of the higher units will be estimated generally from those of the lower.

21. Suppose under the Decimal System of coins one pound is sold for 40 mils, would not this advantage be to a great extent reversed? It is not fair, when arguing the merits of two systems, to assume that one only is in operation.

22. Upon all these points the advantages of the Decimal System appear to me to be absolutely incontestable.

23. The processes of trade will readily adjust themselves to the coinage, and when it is found not to be convenient to proceed by division, tradesmen will proceed by multiplication. It is strange to find Mr. Yates arguing against the Decimal System when he is advocating the adoption of the French system of coins, weights, and measures *in toto*. The argument, if true, affects a small part of the subject only.

24. Experience has refuted Mr. Adams. The Americans have, to a great extent, abandoned the binary subdivision of their dollar. If the French Government had withdrawn the old coinage, and replaced it by one adjusted to the Decimal System exclusively, no great delay would have ensued upon its reception.

26. Sir J. Herschel will give his own answer. I believe his evidence was very much misrepresented and misunderstood. He was very desirous of advocating a decimal metrical system, and was made to say what he did not mean, that the adoption of the second must precede it.

27. If such be Sir J. Herschel's opinion I differ from him; but I feel very strongly the importance of a decimal metrical system, more especially for contracts and accounts.
If not made simultaneously, which might be too vast an operation. I think the decimal coinage should undoubtedly take precedence.

28. In a complete Decimal System, practice, as an arithmetical rule, would rarely be used. If it extended to coins only, the mixed numbers would generally be reduced to a multiple of the lowest unit.
No person would think of applying practice to such an example; it is also most unfairly selected.

29. The result need not be deprecated; but whatever its influence in forcing further reforms may be, I do not think it will arise from any serious addition to the inconvenience which they now occasion.
Bankers reject all below a penny; public convenience would soon fix the limits, beyond which it would not answer to push their calculations.

30. This would in fact be a great convenience; how much more rapid would calculation be if the practice was general; the number of parcels would give the number of lbs. without reduction.

31. A very strong argument in favour of the adoption of a Decimal Coinage.

32. Coins may be introduced or withdrawn by the authority of Government as rapidly as may be required. No operation is so easy as the introduction of a new coinage; look at France, America, Belgium, and latterly Switzerland. In this country, with an unlimited command of machinery for coinage, perfect organization and facility of communication, the change of the coinage would be made not only rapidly but certainly.

33. The Commission of 1821 changed our measures of capacity both for wine, beer, and corn, less for the sake of uniformity—which was desirable—than to satisfy a philosophical fancy of no practical utility whatever. The alteration of the corn measure produced great inconvenience; the old Winchester bushel should have been retained, as much the most important of our measures of capacity.
I have changed my opinion.

34. It is this departure from the decimal scale in the subdivision of our primary units, which produces all the intricacies of our arithmetic. It is somewhat against the views advanced in this No., that our railway surveyors and engineers generally divide their measuring staffs into decimals; surveyors of lands, with the chain, proceed by the decimal scale, and then reduce the results to the barbarous scale of acres, roods, and perches; and our foot rules are now divided decimally as well as duodecimally. Are not these facts proofs of a growing desire amongst practical men to emancipate themselves from our metrical system?

35. Why require us to do that in the first instance, which we must not do in every important arithmetical process; in the arbitration of exchanges, and in almost every transaction of life?

36. Wherever the Decimal System of coinage has been introduced it has taken root almost immediately, and superseded the ancient coins both in accounts and trading transactions. The case was somewhat different with the French metrical system in the first instance, as no sufficient care was taken, in the troubles of the revolution, to supersede the old measures, and to replace them by the new ones. The Bourbons, on their return, in conformity with their reactionary system, sanctioned the continuance of the old by the side of the new system. I believe that after the revolution in 1830 the Decimal System was introduced to the exclusion of all others. The same system prevails universally in Belgium.
Is this conclusion confirmed by recent experience in America? No attempt has been made there to introduce a decimal metrical system.
If we consider the rough mode in which the prices of small portions of commodities are estimated no apprehensions need be entertained. A very short experience would be sufficient for their adjustment. We may be quite certain that the loss and gain will be pretty equally distributed.

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Has any such difficulty ever occurred in France?

Prices of such articles will be estimated in mils and its multiples, as they are by cents in France and America. They proceed by the ascending and not the descending scale.

Altogether unfounded.

37. A Decimal Coinage must precede decimal accounts, on account of the reductions which must otherwise precede it. No law can enforce the adoption of decimal accounts, but a Decimal Coinage would at once make it general; accounts must follow coinage.

Mr. Leavitt, whose authority is quoted, advocates the simultaneous use of a decimal currency for accounts with a duodecimal coinage, differing four per cent. from the other, for retail transactions. It is not easy to conceive the enormous confusion which such a mixture of systems would produce.

38. Which is considered as the integer or primary unit, the pound, the shilling, or the penny?

No system in this respect can be comparable to the decimal: it requires no reductions.

Is the present system comparable, in nearly all these particulars, to the decimal, clearness of conception included?

The tendency to multiply is at least as natural as that to divide, whilst the process of multiplication is made easier.

39. It is the factor 3, amongst the divisors of the shilling, which totally upsets the uniformity of the system, and leads to indefinite decimals.

Most probably accidental; and with reference to most arithmetical processes undoubtedly unscientific.

41. The multiples of the mil between 1 and 1,000 afford every variety of intermediate value which the business of commerce or trade can require. In all these Nos. it is the same issue which is involved—division against multiplication,—which is the easiest?

42. This is impossible. The Government may require their accounts to be decimalized, and contracts to be drawn up in decimals; but without a Decimal Coinage the reductions which must precede accounts in the ordinary transactions of life would be perfectly intolerable.

43. All attempts to make our English commensurate with foreign coinage, such as the franc or dollar, must be nearly useless, in consequence of the variations of exchange. This is the rock upon which the universalists have split.

44. Yes.

45. The penny system of decimalization displaces the £ sterling; it is also somewhat too high in value, taken as the lowest member of the scale, for the purposes of retail trade.

Bankers would probably reject all sums less than 5 mils, as they now reject all sums less than a penny; in that case a simple dot or stroke would supersede the column of farthings.

46. Quite impracticable. The wildest advocates of the penny system have never ventured to propose this.

47. Certainly not. But why write them as fractions if your units, whether of coins or account, are sufficiently low? The rea in Portugal is really a coin of account, and so to a certain extent is the cent in France; but in poor countries, lower coins are required than in ours. With respect to the half-cent in the United States, it is used as a mark merely, which is at once translatable into 5 mils, or the corresponding decimal, ·5 of a cent.

49. This is of course impracticable.

50. It will require the cent and mil only. The first will be principally a coin of account; the second so nearly identical with the farthing as hardly to be distinguishable from it in the popular mind. There will be coins of two and five mils, which in time would supersede the halfpenny and penny, but the penny, halfpenny, and farthing would or might be allowed to circulate, after proclamation to that effect, for four mils and two.

52. No inconvenience would have resulted from centesimalizing the florin, replacing the term mil by cent; this change would not in the least interfere with the system, but it is of little importance.

53. The mil in this scale would only be one fifth of the proposed mil of our coinage; it is too small to be represented by a material coin.

No inference of any importance whatever.

Perfectly easy to work, but not required.

The smallest variations of price become important, as that of lbs. of cotton, when multiplied by large numbers. The merchant must in all cases decimalize such transactions when he makes out his accounts. This would hardly be affected by any system of coinage.

54. Admitted.

55. I think not; it is nearly a matter of indifference whether we millesimize the £ or centesimalize the florin. I should, in some respects, have rather preferred the latter.

56. Certainly; a high primary unit of value is required in a rich country.

57. Answered before.

58. Yes.

59. If bankers should determine to admit no sum less than five mils into the column of mils, a dot or stroke rapidly written and rapidly summed would occupy that column or replace it; if four mils be the unit a similar abbreviation would be practicable; no difficulty would, in fact, in any case, attend the management of this column; it would be retained or modified according to circumstances: but, even in the first case, decimal accounts would be much more rapidly written and summed than by the present system.

61. A duodecimal arithmetic would have many recommendations; but who would propose it?

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62. Our copper coins are tokens or representatives only of value, having reference to gold. The penny and the farthing might continue to circulate as four mils and one mil respectively, the shilling being commutable for twelvepence halfpenny. The operation would be similar to that which took place with the change of the Irish shilling, and would be effected as easily. This near coincidence of the farthing and mil is one of the circumstances which would greatly facilitate the introduction of the new system. I take it for granted, however, that the old copper coins would be withdrawn from circulation as rapidly as was found to be convenient, and replaced by new coins.

I believe this danger to be very slight, and the amount of individual loss too trifling to be noticed.

I think Lord Overstone would hardly sanction the penny system of Mr. Rathbone, or any interference with the £ sterling, as the great unit of our coinage.

63. There can be no doubt with respect to the first. Admitting a small change in the representative value of the penny, its multiples and submultiples would remain nearly unaltered, except in giving change for a shilling.

64. Noticed before.

65. This query seems to admit the general advantages of a Decimal Coinage. Many of those advantages are quite independent of a decimal metrical system, though much increased if combined with it.

The proverbial inconvenience of compound arithmetic is here referred to. This most especially affects the education of the lower orders and of many of the upper. A great proportion of schoolboys are never able to conquer it; and those who do so must devote rarely less than a year to a study which unduly burdens the memory, and which, by diverting the mind from the higher departments of decimal arithmetic—decimals as usually called—puts a stop, not merely to the use of logarithmic tables, but to all the higher applications of mathematics. It is well known that French boys advance much farther in arithmetic and its applications, after the same length of study. This is in a great measure owing to their admirable Decimal System. Why are tables of logarithms so rarely seen or used in our counting-houses?

I believe the adoption of the Decimal System, if once fairly undertaken by the Government, to be certain and inevitable. There is no example of its failure, where proper precautions were taken to introduce a sufficiency of the new coins, and to withdraw the old coins which were incommensurable with them, and it is now rapidly extending to every part of Europe.

I see no advantage likely to result from the further ventilation of the question. There is no doubt that 19-20ths of those persons who have really studied the subject are in favour of its adoption, and very little impression is ever likely to be made upon the remainder.

I think Lord Overstone has done full justice to his well-known acuteness and ability in his pleadings in favour of our existing coinage; but it is sufficiently singular that nearly all those elaborate and carefully worked out arguments resolve themselves into so few which really merit consideration; or rather, if we assume that the Decimal System is once introduced and adopted, there is only one which remains, and that is, the want of a sufficient number of binary subdivisions in decimal coins; he seems, however, to have ignored the rapid change of habits which a change of the coinage would introduce. If convenient subdivisions were wanting in our coins, tradesmen and others would reverse their order of proceeding, adopting generally multiples of an inferior unit instead of subdivisions of a higher. They would proceed from mils to shillings and not from shillings to mils; from ounces to pounds, and not from pounds to ounces.

I do not believe there is any sufficient reason to delay the adoption of this measure. It has already been sufficiently discussed, and it is not likely that the public generally will ever be better prepared for it than they are at present. A preparation has already been professedly made for it in the introduction of the florin. The system is generally noticed in our new books of arithmetic. Examples in our better schools are given in illustration of it: it has been repeatedly and ably discussed at various public meetings, and it is well known that the opinion of an immense majority of those whose opinion is worth considering is in favour of it; what, therefore, is likely to be gained by delay?

GEO. PEACOCK.

(*Communicated by Lord Overstone.*)

R. Slater, Esq.

ROBERT SLATER, Esq.

Answers to Questions 1, 2, *and* 3. I do not consider that any change in our present system of coinage is required from any inconvenience felt by the people in the practical working of that system, either as regards the keeping of accounts or the purposes of circulation.

4. The original design of all systems of coinage was doubtless to promote the exchange of commodities; but the scientific as well as primary object of the coins themselves, I consider to be, the easy adjustment of retail rather than wholesale transactions. This is effected by the subdivision of the highest integer of money value into the most convenient aliquot parts, in proportion to weights and measures of general commodities, so as to facilitate not only the settlement of small transactions, but the calculation of broken quantities at given prices. These qualities are possessed by the binary and duodecimal system of our present coins in an eminent degree.

5 *and* 6. Coins for circulation, and monies of account, are two distinct ideas. The general convenience of the people at large, by whom the coinage is circulated, ought, I think, to be regarded as of prior estimation, rather than the convenience of a section of the people, for purposes of account, more especially as the varieties of coins must always be greater for the necessities of circulation than for monies of account, and because the former must always comprehend whatever the latter can require.

7. I do not recommend the Decimal principle for our coinage, but would not object to it as an experiment, provided it was introduced with a low rather than a high integer, on a well-digested plan, simultaneously with a decimal division of our weights and measures.

R. Slater, Esq.

8, 9, *and* 10. The reasons in favour of the number 12, assigned by Vaughan (1675) and Napoleon I. appear to me unanswerable, and present most valid grounds of objection to the proposed introduction of a Decimal System of Coinage. The factors of 12, harmonizing so conveniently with the divisions of our weights and measures, and being so much more numerous than the factors of 10, which do not so conveniently harmonize, are a great aid to mental calculations, which every one learns in the purchase of the common necessaries of life. The advantage of a Decimal System seem chiefly confined to simple addition, while the operations of multiplication and division (at least while the weights and measures continue unchanged in their proportions to a Decimal Coinage) are rendered more laborious from the greater number of figures required to obtain a result, rendering mental calculations impossible.

11, 12, *and* 13. The more condensed any object that the mind has to deal with the easier is it managed. This is exemplified by the examples in Question 12:—7*s.* 6*d.* is of the same value as 375 mils, but the twelfth part of 7*s.* 6*d.* (7½*d.*) is seen at a glance, while the twelfth part of 375 is a mental operation of some difficulty. The duodecimal system, so to speak, presents the result before the mind's eye without calculation, while decimals impose labour. If the mind does not at once see its way to a correct result, the calculation must be made on paper, and hence much loss of time where there are numerous transactions.

The real perfection of any system of coinage is to be tested by the greatest variety of payments which may be made by the smallest number of pieces. At present (in the absence of a knowledge of what the pound and mil plan will introduce) there is no means of forming a perfect comparison between that and our present system; but, if there is a difference in that respect, I should suppose it would be in favour of £ *s. d.*

14. By the three separate systems (according to Mr. Minasi's calculation, see Society of Arts Journal, 5 Oct. 1854), where the sum of all figures in ordinary accounts are under 10*l.*,

1st. The tenpenny system requires a less number of figures than our present system of £ *s. d.* by 2-3rds per cent., while the pound and mil plan shows an increase of 9¼ per cent.

2nd. For the same reason the tenpenny system must be more concise, as, requiring fewer figures, it can be expressed or written in fewer words.

3rd. I consider our present system of £ *s. d.* possesses the advantage over the two others for mental conception of the sum stated.

4th. The tenpenny system, I conceive, has a greater tendency to accuracy, as it has only two decimal places (which in accounts may be reduced to one), while the pound and mil plan has three decimal places, and our present system three distinct money columns.

5th. The present system of £ *s. d.* I think the easiest for mental calculations.

6th. The integer of tenpence and its cents is in perfect harmony with the coins now in use; but the decimals of one pound are not so, and would not interchange with any of our coins lower than sixpence.

A system of decimal monies, whether for circulation or account, which is incapable of division by 3, 4, 6, and 12, as is shown by the examples stated, cannot be a system deserving of recommendation as an improvement on our present coinage.

15—23. The superiority of our present system is here strikingly exemplified in the greater number of aliquot subdivisions of 1*l.* than it is possible to obtain under the pound and mil system, and in the smaller number of figures required in stating results. At present it is not usual to post anything in the ledger of lower value than one penny. Under a Decimal System with ten pence as the integer, the same rule would doubtless be observed, thereby assigning one place of decimals only, on the right hand of the unit. But by the pound and mil system three decimal places are indispensable, because the value of the third place in a single sum may amount to nearly 2¼*d.*

The impossibility of dividing decimals exactly by 3, 6, 8, 12, and 16, appears to me to be a fatal objection to such a system being introduced, when it is considered that in long measure we have 12 inches to the foot and 3 feet to the yard; in measures of capacity we have 8 bushels to the quarter, 36 gallons to the barrel, and 54 gallons to the hogshead; in avoirdupois weight, 16 drams to the ounce, 16 ounces to the lb., 14 lbs to the stone, 28lbs. to the quarter, and 112 lbs. to the cwt.; in troy weight 24 grains to the pennyweight, and 12 oz. to the pound; besides numerous other non-decimal divisions. In contracts as to time weekly wages are divided into 6 days and daily wages into 12 hours, all of which subdivisions bear a relative proportion to the binary or duodecimal principle on which the coinage is founded. Until these objections could be overcome (and that can alone be accomplished by a decimalization of our weights and measures) it would be hopeless to expect a system of Decimal Coinage to be introduced either satisfactorily or successfully.

16, 17, 18, 19, 21, *and* 22. Under any system of Decimal Coinage, whatever may be decided upon as the integer there seems no possibility of avoiding inconvenience and confusion, unless the weights and measures are simultaneously decimalized. Coins themselves are still, as they always have been and ever must be, dependent for their current value on certain weights. The fluctuations in the prices of the precious metals, like all other commodities, are governed by supply and demand, but the quantity of the metals is always determined by its weight. For this reason, if there were none other, coins and weights ought to bear a relative proportion to each other in their respective subdivisions, otherwise the exchange of commodities cannot be effected without inconvenience. Our present system possesses that advantage, which we should lose by a Decimal System of Coinage.

22. It is proved that the pound and mil scheme would involve a greater number of figures, and possess less brevity of expression, whether spoken or written (14). In stating accounts, that system must therefore possess less facility, without possessing greater simplicity, than our present form. In calculations, however, it is submitted that the duodecimal system is most convenient, as these are more readily performed mentally than they could be effected by decimals:—ex. gr., take 366 at 1*s.* 9¾*d.* This is at once seen to be 30½ dozens at 1*l.* 1*s.* 9*d.* = 32*l.* 12*s.* 6*d.* + 10*s.* 10½*d.* = 33*l.* 3*s.* 4½*d.* This result is at once arrived at by means of the number 12 (the quantity being

divided, while the price is multiplied, by that number); but it can be as speedily obtained by the number 20 (240 pence being 20*s.*). The 360 is equal to $1\frac{1}{2}$, and the 1*s.* $9\frac{3}{4}$*d.* to 21*l.* 15*s.*, in the same proportion, producing 32*l.* 12*s.* 6*d.*, which, added to 6 at 1*s.* $9\frac{3}{4}$*d.* = 10*s.* $10\frac{1}{2}$*d.*, gives the former result of 33*l.* 3*s.* $4\frac{1}{2}$*d.* This is only an exemplification of the facility for mental calculations afforded by the system of £ *s. d.*, which the Decimal System could not afford, as broken quantities and pieces would require to be calculated by pen and ink.

23 *and* 24. In retail transactions (which are the object and end of all wholesale operations) it seems more natural to think of halves, quarters, thirds, eighths, twelfths, &c., than of any decimal division. It is not that this mode of thought has been induced by the binary and duodecimal principles which have hitherto prevailed in our weights and measures, because in those countries where the decimal system of division has been in use for many years (as in France and the United States) the practice of the lower orders, who form the great bulk of the retail customers in every community, still clings to the binary and duodecimal principle. This truth is referred to most successfully in *Quincy Adams' Report to the Senate of the United States*, in which the binary principle is described as the most convenient, although in the face of a system of Decimal Coinage. He there speaks of the eighth and sixteenth of the dollar being introduced, in order to facilitate such binary operations, and refers to these as among the most useful of their coins.

25. One great advantage possessed by our present system is, that each coin, being itself an aliquot part of the pound, is divided on the same principle, and is composed of distinct coins, so divisible, down to the lowest denomination, viz.:—

£	*s.*	*d.*			
1	0	0	is subdivided into	11	denominations of coins.
0	10	0	,,	10	,,
0	5	0	,,	8	,,
0	2	6	,,	5	,,
0	2	0	,,	7	,,
0	1	0	,,	6	,,
0	0	6	,,	4	,,
0	0	4	,,	3	,,
0	0	3	,,	3	,,
0	0	1	,,	2	,,
0	0	$0\frac{1}{2}$	,,	1	,,
0	0	$0\frac{1}{4}$	,,	0	,,

Our present coinage is therefore most convenient for the payment of every variety of retail operations, which cannot apply to any decimal coin, the value of which terminates in the figure 5. The sixpence (equivalent to 25 mils) is therefore incapable of such subdivision.

26 *and* 27. I entirely concur in the opinion stated by Sir John Herschell for the reasons assigned at No. 16. The coinage is itself dependent on the weights and measures, and not the latter on the former. If any preference were therefore to be given, it ought rather to be yielded to the weights and measures, so that the people might become familiar with the change before the coinage was altered.

To introduce the decimal division into weights, measures, and coins, concurrently with the binary principle at present in operation, might lead to some confusion in the first instance; but I have no doubt it would soon become understood, and would afford an opportunity of testing the estimation in which the Decimal System was held by the encouragement it would receive at the hands of the public. In such an event I should recommend the multiple to work upwards from the penny, rather than the decimal downwards from the pound.

28. The case given by Sir Charles Pasley appears altogether exceptional, if not imaginary, and to obtain an exact result must of necessity involve much calculation, even if both weights and coinage were decimalized. I am not aware of any commodity whatever, not even gold, the value of which is so precisely regulated as to involve pence and farthings in so large a quantity as a ton. These lower coins are more likely to be found attached to small weights. Tons are more commonly priced at pounds alone, or in shillings, than in broken or mixed money. It is in the reduction of the ton to the price of the lb. where I apprehend greater difficulty will be encountered were Decimal Coinage to be introduced unaccompanied by Decimal Weights. At present such reduction is an easy operation by mental process alone, and is an evidence of the advantage afforded by the duodecimal principle of aiming at speedy and correct results, because tons are to cwts. what pounds are to shillings, and the number of farthings in one shilling (48) being equal to 3-7ths of the number of pounds avoirdupois in one cwt. it is only necessary to multiply the number of tons or cwts. by 3 and divide by 7 (an easy process by the mind) to ascertain the price of the pound in farthings.

29. I think so for the reasons before stated.

30 *and* 31. This would seem to be a necessary consequence, both in wholesale and retail quantities.

32. (See *ante*, 26 and 27.)

33. The arguments in favour of retaining our present subdivision of weights and measures apply with equal force to the coinage. Dr. Peacock's opinion appears to me to be a sound one.

34 *and* 35. In common conversation we talk of tens, hundreds, and thousands, and therefore may be said to think decimally, but in the practical application of numbers we have recourse to the binary principle as most convenient.

36. Dr. Leavitt's opinion of the superiority of the Decimal System for the purposes of accounts may be open to dispute, but his reasoning on the advantage of the duodecimal system is unanswerable; and the inconveniences to which he refers as constantly felt in the United States, in small retail transactions, from the absence of that quality in the Decimal Coinage, would equally be felt here. In all cases where small coins would not admit of precise subdivision the seller would always take advantage of the difference, and a certain loss would therefore fall on the buyer, which might or might not be compensated by the turn of the scale. Were it otherwise, a constant repetition of such differences, especially in the case of small transactions, would seriously affect the

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profits of the seller. The smaller the coins the greater the probability of such differences, and the greater the per-centage of loss to the consumer. Besides the inconvenience and dissatisfaction which could not fail to arise in such small retail operations, the loss would certainly fall on the poorer classes.

37. I apprehend that a Decimal System for accounts could not be introduced successfully unless with a low integer, containing not more than two places of decimals, as these might be so adjusted as to harmonize with a coinage duodecimally subdivided. The dollar is at present the highest decimal integer in use, but even that coin (with its two decimal places) is found inconvenient for retail operations without the aid of 8ths and 16ths. With the proposed integer of 1*l.*, and three places of decimals, such harmonious adjustment is impossible.

38. I entirely agree as to these primary requirements for a good system of Coinage.

39, 40, *and* 41. I also agree as to the advantages afforded by our present system. That system cannot be considered as the result of accident. It is founded on science as well as simplicity. The "pennyweight," as its name implies, was equally the 240th part of the pound troy, as it was of a pound of silver. But the money pound itself was merely a nominal coin, and continued so for several reigns after the Conquest. In the reign of Edward the Confessor, the silver penny was stamped with a cross on the reverse, and, it is said, was broken into quarters for smaller monies. This seems to have been the origin of our farthings, which afterwards became a part of the regular coinage. The subdivision of the coins, however, as they existed in the reign of Henry II., was admirably suited for convenience; and, with some few exceptions, it remains the same at the present day. The pound, besides being divided into halves, quarters, eighths, and twentieths, was divided into the noble of 6*s.* 8*d.*, being one-third, the half-noble of 3*s.* 4*d.*, or one-sixth, and the quarter-noble of 1*s.* 8*d.*, or one-twelfth. The shilling of twelve pence was also subdivided into the groat of 4*d.*, the half-groat of 2*d.*, and the penny.

The subdivision of these coins was evidently intended to harmonize with the weights at the period they were introduced. And the original adoption, as well as the long retention of that system, can be alone accounted for by its great convenience.

42, 43, 44, 45, 46, 47, *and* 48. Neither the decimal pound, nor the decimal shilling, can be divided into 3d, 6th, 12th, or 16th parts precisely; nor can they be represented by any combination of coins under the pound and mil scheme. The only Decimal System by which such parts of a pound and a shilling could be represented either in coinage or in account, is by an integer of tenpence.

Mr. Snowden's suggestion as to 100 farthings, halfpence, or pence being adopted as the integer of a Decimal Coinage, is worthy of consideration, as either of these integers almost assimilates to, or forms part of, the dollar of the United States, and is infinitely superior to the 1,000 mil scheme, which assimilates with no other system. But I submit that the tenpence divided into 100 parts will be a superior integer, from being still more concise and convenient for accounts, and as nearly assimilating to the franc of France,—a system of coinage now spreading over other countries in Europe. Such an assimilation would be attended with great advantage in our exchange operations with the Continent. As the farthings are voluntarily omitted in accounts, at present, the second decimal place which corresponds to them might also be omitted, if thought necessary. But whether the tenpenny or the penny be adopted as the integer, it would occasion no disturbance in the existing coinage. Were the penny adopted, its fractions of $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ would be more convenient than its decimal parts, and are indeed in common use in the United States at the present time. It is certainly not desirable to abolish our existing copper coinage, if it can be avoided.

49. I doubt much whether accounts would be kept on a new principle in the absence of actual coins as a foundation for them; but I think the advantage supposed in this question could more effectually be gained by the introduction of a new coin of tenpence, and another of $\frac{1}{10}$ of one penny. The latter small coin would, I think, be found convenient in account sales, and in pricing and invoicing many articles now manufactured by machinery, which at present are produced as low as 8ths, 16ths, 32nds, and even 64ths of a penny.

50. The £ and mil scheme would certainly involve more than two monies of account, owing to its three columns of decimals, and cannot fail to lead to much confusion.

51. Our present system involves at least three monies of account. Some other nations in Europe, which have not adopted the decimal principle, have also three or more; but I understand there is a growing desire to reduce them to two denominations only, as we see in the instance of Holland, Belgium, Switzerland, &c., where the Decimal System has only been introduced of late years with a low integer.

52 *and* 53. There ought not, in my opinion, to be more than 100 steps between the lowest and highest monies of account. I know of no Decimal System using more. 1,000 steps must certainly be attended with great labour.

The inference to be drawn from the practice in the United States is altogether in favour of a low unit. If they find it convenient to use a vulgar fraction rather than a decimal for a value under a cent of a dollar, what is likely to be the result with the cent of a pound, or even the thousandth of a pound, when values already descend to very minute fractions? The experience of the United States shows that there are commodities even there, where the lowest decimal is not low enough, and cannot be represented so conveniently as by a vulgar fraction.

54, 55, 56, 57, *and* 58. The division of the pound into 1,000 mils would interfere most materially in mental calculations, as the want of the binary or duodecimal principle would deprive us of a stage or resting-place for determining the relative values of quantities and prices. These advantages have been already referred to. If it is necessary at present in those countries to have recourse to written calculations with an integer divided into 100 parts, the inconvenience must be much increased where the integer is composed of 1,000. There would besides be no harmony between the United Kingdom and other countries in their Decimal Systems.

59. The increase in the number of figures, as well as the labour, will be much greater; and for the mere sake of preserving the £ intact the pound and mil scheme not only offers no advantage in keeping accounts or facilitating trading operations, but will occasion great inconvenience and loss of time.

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60 *and* 61. The defective character of decimal numbers for binary and duodecimal division has been already shown. The opinion on this point expressed by Quincy Adams is decisive, although it is matter for surprise that in the United States some efforts have not been made to introduce the decimal division into their weights and measures so as to overcome in some degree the inconvenience he mentions. They have been doubtless prevented from attempting this by the consideration that such an alteration would present another most disturbing element in their operations with England and France, whose weights and measures already differ, but from which countries they draw the bulk of their supplies. In adopting any system of decimal division applicable either to weights and measures or coinage, I think it ought to be a primary consideration to study how far the introduction of a new principle could be made in agreement with the already existing integers of other countries with whom we have large trading transactions.

62. I think the confusion and difficulty apprehended by some persons as likely to arise from the change which would take place in the value of our lower coins, if the pound and mil system were introduced, are well founded. If a Decimal System must be introduced at all it ought not to involve so serious an evil; and it is only by preserving the penny intact that this can be avoided.

63. The inconvenience I should suppose will be felt quite as much by the higher as the lower classes; if it did not meet with general acceptation. My own belief is, that it will be speedily found to be unworkable.

64. I think the points referred to in this question most deserving of deep consideration by the Commissioners. The bulk of trading operations is performed by the lower and poorer classes, many of whom are incapable of reading or writing, far less of performing either mental or written calculations. It is of first importance to them that the greatest simplicity should exist in all money operations in which they are concerned. They are, I should think, much more likely to understand calculations involving the 4th of one penny, or the 12th of one shilling than the 1,000th of one pound, however scientifically divided, for the reasons already explained, that our present system of coinage is so capable of numerous divisions on a binary or natural principle, while a Decimal System is capable only of a few.

65. Looking at the question in all its bearings, I scarcely think that it is desirable or prudent to introduce a decimal division of our coinage at all; but certainly not, unless accompanied by a decimal division of weights and measures. The proposed pound and mil scheme I cannot conceive will ever be found to answer the expectations formed by its advocates. That education will be promoted by its introduction, or by means of a Decimal Coinage at all, appears to me a most mistaken idea. Indeed, I would regard the substitution of decimal calculations in place of the compound arithmetic taught in every parish school, as a national misfortune, as in no way adapted to sharpen the intellects of the rising generation.

In conclusion, if it is considered desirable to try the experiment of a decimal division of our currency, I am in favour of that system which preserves the penny.

ROBERT SLATER.

104, Fore Street, City, 2d May, 1857.

(*Communicated by Lord Overstone.*)

R. Slater, Jun., Esq.

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Answer to Question 1. I think it might be desirable to introduce smaller coins than the farthing, to enable the poorer classes to receive the advantage of fluctuations in the value of the chief necessaries.

2. The coins at present in use I consider convenient, except the crown piece (objectionable from its size), and the florin and threepenny pieces, which too closely resemble in appearance the pieces of the nearest value, which are more convenient subdivisions of higher coins.

3. The calculations necessary to arrive at the results of retail transactions are, under our existing system, simple and readily grasped in the mind; and the amounts, I consider, are paid with facility in our current coins.

4 *and* 5. I conceive coins to have originated from the necessity of finding some ready means of adjusting transactions between man and man, the multitude of which, in the present state of society particularly, are small. I consider therefore that the integer of all coins, to be convenient, should be adopted (and, in most cases, has been originally adopted), with the view to the ready and mutual subdivision of commodities and coins. I am therefore of opinion that the main purpose of coins is to adjust small payments; then they should be regarded as instruments of calculation; and lastly, in a yet inferior degree, as the medium of accounts.

6. Looking at the probable origin of coins it is evident that they must be made, both in the integer and its subdivisions, capable of adjusting themselves to the ready settlement of commodities most frequently interchanged. Our present coins do not, in this respect, descend low enough; for example, the lowest fluctuation of wheat in the market which can be represented by $\frac{1}{4}d.$ on the price of the loaf is 2*s*. Again, many articles of minute value must be purchased in extravagant quantities. The centime in use on the continent affords foreigners a much lower subdivision of money than we possess in Great Britain, and yet there can be no doubt but that in this country we produce very many more articles of minute value than they, as we employ machinery to a much greater extent.

I consider that to afford the public every facility for the adjustment of their perpetually-recurring transactions, and satisfaction of their small but imperative wants, is of infinitely more importance than the saving, to a proportionately small body of the community, of a slight amount of labour in recording their accounts.

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7. I do not recommend the introduction of the decimal principle into our coinage before the adoption of the same principle with regard to weights and measures.

8. It is a serious objection to the Decimal System that it prevents the subdivision of the integer in the same degree as is possible under the present system of coins.

9 *to* 12. The advantages possessed by the number 12 over 10 are evident, from the larger number of factors the non-decimal possesses, enabling calculations to be made and quantities to be subdivided so much more simply and so much more extensively than can possibly be the case with the number 10. This is plainly and very forcibly instanced in the cases alluded to in Query 12.

By a judicious selection of coins, payments might be made by as small a number of pieces under the decimal as under the present system.

13. The weak point of the Decimal principle consists in the impossibility of dividing it beyond two points without fractions, whilst the requirements of society, influenced by the nature of things in general, demand a binary division carried to the utmost extent.

14 *and* 15. It has been established by Mr. Minasi (see Journal of Society of Arts for 5th October 1855) that there is an economy of figures in recording sums written in pence compared with our existing system; both these plans require, however, from 4½ to 9 per cent. fewer figures than the £ and mil system. Conciseness of expression in words and in writing attaches therefore to the penny system in a higher degree than to the present system, whilst both possess a considerable advantage in this respect over the mil system. The facility for mental conception of the sum stated must however be measured by the habits of the man employing it; an Englishman conceives at once the sum implied in the expression 520*l.*, which a Frenchman understands equally readily in the expression 13,000 francs. The fewer figures are employed the less risk there will be of making errors in copying or calling over; in this respect, therefore, the penny plan has the advantage.

In comparing with each other the mil and penny decimal systems the advantage is much in favour of the penny, one numeral expressing a small sum in pence which three numerals are required to express in mils. If, to economise figures, seventy mils be written 70, they may, in copying, be placed on the paper in such a way as to cause their being mistaken in addition for 700. Facility of calculation is afforded in a remarkable degree by our present system, under which the ratios subsisting between our coins and weights and measures, or abstract quantities generally, may be employed so readily, and to so great an extent, that results may be arrived at mentally in a short period of time, which under any Decimal System is, in the majority of instances, impracticable. As the greater number of the transactions of life are based upon prices small in amount, and as these small sums, under the mil system, require more figures than under the penny system, mental calculations cannot be carried so far by the mil as by the penny. The perfect interchangeability of our coins now in use for equivalents in the tenpenny system is one great merit of this plan, inasmuch as we might to-morrow, without the alteration of any existing coin, introduce a Decimal System either in accounts and coinage, or in accounts alone, and not in coinage, try practically its working, and if we found it inferior to £ *s. d.*, at once revert to the original without creating confusion, without compelling opponents to adopt what they regard as highly objectionable, and without forcing the labouring classes (who have taken really no interest in the question) to change their habits of thought in regard to money matters, if they did not see any advantage in doing so. Contracts, whether public or private, would remain undisturbed, payments might be adjusted with facility and exactness, and prices would not be affected. On the other hand the adoption of the mil system would render the interchangeability for equivalents in the new plan of all amounts (except those few composed of even shillings and sixpences) impossible, and great confusion would arise while the country was in the state of transition. No opportunity can be afforded of practically testing the plan, which must be applied at one and the same time to both accounts and coinage, without the possibility of revoking the step taken, unless at the cost of similar objections on returning to our present system; the community at large would have a system thrust upon them which they do not understand, and which they would be unwilling to adopt from the loss inevitably entailed in all transactions in which small coins are employed, whilst our postal system, rates, charges, contracts, and prices generally, based upon the penny, would be altogether dislocated.

16 *to* 19. I consider it would be fraught with great inconvenience were a decimal principle to be introduced into our coinage, without a similar principle being applied to our weights and measures; indeed I think it would be the proper course, on making any change, that it should apply both to monies and weights and measures simultaneously; but if a partial change were contemplated, I conceive it would be less mischievous to introduce decimal weights and measures before altering the system of coinage. There are many anomalies and palpable defects in our existing weights and measures which might with advantage be cleared away, but I am not prepared to say that a Decimal principle as applied to them would be an advantage, the natural tendency being to make use of a binary subdivision of weights and measures.

20 *and* 21. The ratios existing between the subdivisions of our leading weights and measures and our coinage, enable us to calculate speedily and exactly, by a mental process, the values of small quantities, so that dealers when buying in the bulk can at once tell whether articles purchased by them in tons, cwts., gallons, pieces of a given quantity of yards, grosses, &c. are adapted for their peculiar requirements. Under a Decimal System they would have to perform such calculations on paper at a loss of time, and at a risk of error, in the open market.

22. I am not of opinion that a change to a Decimal System of notation and coins merely, would afford us any advantages in regard to facility in stating accounts, and in simplifying calculations or payments.

23 *to* 25. To be convenient for purposes of caculation, there must be a series of proportions in the subdivisions of monies, weights, and measures, and the tendency of human nature being always to divide binarily, because tolerable exactness can be secured in that direction without great trouble, any system founded on decimals in one of the mediums, and not in the other, is a step out

of the right direction. Our present system in this respect is vastly superior to a Decimal System; thus,—

960 is divisible by 26 (smaller) whole numbers, of which 3 are divisible binarily in the 6th degree.
4 „ „ 5th „
4 „ „ 4th „
4 „ „ 3d „
4 „ „ 2d „
4 „ „ 1st „

240 is divisible by 18 (smaller) whole numbers, of which 3 are divisible binarily in the 4th degree.
4 „ „ 3d „
4 „ „ 2d „
4 „ „ 1st „

12 is divisible by 4 (smaller) whole numbers, of which 1 are divisible binarily in the 2d degree.
2 „ „ 1st „

Whereas on the other hand,

1,000 is divisible only by 14 (smaller) whole numbers, of which 3 are divisible binarily in the 3d degree.
4 „ „ 2d „
4 „ „ 1st „

100 is divisible only by 7 (smaller) whole numbers, of which 2 are divisible binarily in the 2d degree.
3 „ „ 1st „

10 is divisible only by 2 (smaller) whole numbers, of which 1 is divisible binarily in the 1st degree.

From this it will be seen that our present coinage admits of extreme subdivision, whilst the decimal principle is necessarily very limited in this respect.

26. Any system of Decimal Coins without a concurrent Decimal System of weights and measures must prove highly disadvantageous.

27. See answer to Nos. 16 to 18.

28. One of the most important operations performed in numbers representing broken sums of money is undoubtedly the finding the price of a broken quantity of material, when the price of a given unit of the material is a given broken sum, and in many instances our existing system enables this calculation to be performed mentally. In the case of the example quoted, given by Sir Charles Pasley, the calculation would be made by a person in the habit of dealing in such materials and quantities by "practice," as shewn forth. If only coins were decimalized, the same plan would doubtless be resorted to by him, without any saving of labour; if both coins and weights were decimalized, simple multiplication would be the means adopted, and I question whether the result would be any sooner obtained.

29. If decimal coins are adopted, decimal weights and measures must sooner or later form themselves on the country as a necessity.

30. If a Decimal Coinage were adopted it would be more convenient, for the purpose of calculating the value of a single article, if goods were made up in tens in place of dozens, but I question if in practice we should find this course pursued to any extent. The French make up stockings, gloves, &c., in dozens, never in parcels of ten.

31 *and* 32. No system of Decimal Coinage should be adopted before the question of weights and measures is matured, or before we have arrived at the best units for starting from in weights and measures, to which the Decimal Coinage should be made subordinate so as to meet the requirements of society.

33. I consider the principles embodied in the present system of our weights and measures sound and more practical than in any Decimal System propounded. It cannot but be admitted that the divisions of our coins had their origin in and beautifully harmonize with the subdivisions of our cardinal weights and measures, and are as it were dovetailed into them; whilst the weights and measures themselves seem to have been determined upon from their capability of often-repeated "bissection," which Dr. Peacock considers of such great importance.

34 *and* 35. I coincide in the view expressed in this query; in generalities men think of abstract numbers and quantities decimally, in particularities binarily. For this our present coins are well adapted.

36 *and* 37. Some few forms of accounts, as those of insurance offices for example, may doubtless be advantageously kept in £ and mils, but the greater number of persons would find it much more convenient to record their transactions in the decimals of a penny. But ledger amounts only represent the totals of numberless separate transactions involving calculations, all of which, I contend, can be more readily effected under a binary system. I quite agree with the Rev. Joshua Leavitt, that the small transactions of daily life outnumber almost infinitely the transactions of commerce, but when these last come to be analyzed, they will be found to have originated under circumstances involving similar calculations; and if he arrives at the conclusion that it is impossible to make a decimal so convenient as a duodecimal currency in regard to small transactions, I do not see how he can arrive at any other conclusion with regard to larger, which they combine to form.

In introducing any Decimal System, not perfectly commensurable with our existing coins, small differences must always arise; these the tradesman will not disregard, and the loss will invariably fall on the consumer.

38. The five points mentioned under this query I consider all important in a good system of coinage.

39 *to* 41. See answer to Nos. 23, 24.

42 *to* 46. The tenpenny Decimal System being based upon 1*d.*, affords us the ready means, with an economy of figures, and without any great inconvenience, of recording accounts decimally, of which the items may have been formed, and can be paid, in existing coins. Every Decimal System is based upon its lowest money unit, on which the multiples are built up; in adopting the mil, we therefore commence with a coin not now current, differing 4 per cent. from our present

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lowest coin, and consequently incommensurable with the majority of amounts as expressed in our existing accounts. Indeed, if we multiply the mil binarily, we can never arrive at an amount for which an equivalent can be found in our existing coins. Treating the 1*d.* in the same manner, we cannot arrive at any sum which it would not be possible to pay in the tenpenny coinage, as we in this case take a coin in present use, and upon that erect the decimal superstructure. There would be no occasion to introduce any lower sum than 1*d.* into the majority of accounts, as we do not now generally descend below that coin, although if it is at any time necessary we can still continue to do so. The adoption of the tenpenny Decimal System would enable us to simplify our exchanges with foreign countries, reducing the present intricate calculations to a per-centage, dollars, florins, and francs all approximating in value to multiples of 1*d.* I would further remark, that the adoption of 50*d.* as the integer would render it necessary, in making calculations having reference to florins, to take two fifths of the amounts, and in the case of francs one fifth. The tenpenny integer would enable us to obtain the value of florins by multiplying by two, and of dollars by multiplying by five (or dividing by two, and adding a cypher).

47. The practice in the United States, France, and all countries employing a Decimal Coinage, is to quote fractions of a cent binarily, as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, &c., doubtless because it is found more convenient in dealing with small values, whether in addition or multiplication.

48 *and* 49. If the Decimal System is to be tried with the view of testing its convenience in keeping accounts, it would doubtless be the most prudent course to make the attempt without altering the coinage; by the tenpenny system this is possible, whilst by the £ and mil system it is not feasible, as it would involve the sacrifice of the interests of the community in a variety of ways, as alluded to in answer to Queries No. 14 and 15.

50. If the £ and mil scheme of Decimal Coinage be introduced as recommended by the Committee of the House of Commons, it will necessitate the introduction of an intermediate money of account between the £ and the mil, as it will otherwise be too long a step from one to the other. I doubt if the public would allow themselves to be incommoded with more; in France and the United States there is practically no intermediate money of account.

51. In countries employing non-decimal monies, such as Great Britain, Denmark, Prussia, the East Indies, &c., more than two monies of account are used; but I am not aware that such is the case in any country employing a Decimal Coinage. The want of it was felt in the United States, owing to the large value of the unit; but, as above mentioned, the public rejected it.

52 *and* 53. Any system of Decimal Coinage, requiring more than one hundred steps between the highest and lowest coins, must be excessively inconvenient, as increased labour is thereby given to the accountant; it is indispensible to employ numerous figures to express small values, and the capabilities of the coinage for mental calculation are thereby confined within very narrow bounds. This point may be considered as having been settled by practical experience in the United States and France, where, if it is necessary to descend in value to a sum below a cent., public convenience has dictated a binary subdivision, as requiring fewer figures, affording the means of ready perception, and of being handled in mental calculations with greater facility. The quotation from the "Times" of 4th April is undoubted evidence of this; and no American or French newspaper can be taken up, without exhibiting similar proof of the unwieldiness and impracticability of the thousandth part of the unit of a Decimal Coinage.

54 *and* 55. The retention of the £ as the principal money of account in a Decimal System prevents our escaping the difficulties and objections pointed out above, which will be in no wise lessened by the necessary introduction of an intermediate money of account; thus placing us at a great disadvantage, as compared with other countries employing a Decimal System, and impeding the facility of transactions of first importance, especially in the case of the poorer classes, who more frequently employ the smaller amounts in the course of their daily experience than their affluent neighbours.

56 *to* 58. Under the existing system we possess the facility of expressing large unbroken amounts in fewer figures and words than either the French or Americans, and at the same time we are enabled to divide our chief money of account into many more clean divisions than they. I have already shown, under Nos. 23, 25, that if we change the £ into the integer of a Decimal Coinage we destroy this advantage.

59. The adoption of the mil would render it absolutely necessary to encumber our accounts with a sum less in value than a farthing, whereas now, in all accounts of importance, we do not descend below the penny; we could not afford to omit the mils as we now omit farthings, as this would involve the sacrifice of all amounts below $2\frac{2}{3}d.$

60. In mental calculations, under our present system, the shilling and sixpence have important functions to perform, for which they are eminently qualified by their susceptibility of division by factors which are aliquot parts of our weights and measures. Were these coins to be engrafted into a Decimal System based upon the £, they would still be available as a medium of payment, but would cease to possess their present advantages, inasmuch as the divisions of which they are now capable could no longer be represented in lower coins.

61. A binary division, being palpably one which may be carried to the greatest practically necessary extent with the utmost facility, commends itself above all others to our use. The deficiency of the Decimal System in this respect is one great source of its weakness.

I think great convenience might have accrued to mankind generally, if in place of the present universal Decimal System of numeration, a system had been adopted admitting of binary subdivision to a superior extent, had the practice been introduced, for instance, of reckoning by eights, by twenty-fours, or by twelves, as referred to by Quincy Adams, in place of by tens, before recurring to the unit. I should, however, think as soon of changing the habits of the people on this point, as of establishing the £ and mil scheme of coinage, especially under our present system of weights and measures.

62 *and* 63. Were the decimals of a £ to be introduced into our coinage it would be impossible to arrange to the satisfaction of all parties the differences which must be perpetually occurring in settling transactions or contracts entered into under our present system, and paid for in pounds and mils.

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Were the tenpenny Decimal System introduced these difficulties would never arise, as the merit of that plan is, that it takes, at its present value, a current coin of the lowest value employed in accounts, and from that proceeds to form decimal multiples; hence there can be no question as to whether penny decimal coins are equivalents of our existing coins; it is self-evident that they must be so; and in addition to this, the language and train of thought employed in the multitude of the money transactions of life, especially amongst the lowest classes, would remain absolutely unchanged. It would hardly be perceived by them that we had made any change, and until the public had seen the advantages attending it, they need not adopt it. At the present time prices of commodities from one penny to two shillings are quoted in pence, and there is hardly a necessary of life which is not embraced within this range. Now, a poor man laying out a few shillings in various quarters has the trouble (small though it be) of converting pence into shillings, by this system he is spared this trouble. Those in a higher position would find little difficulty, from their superior education, in making their larger payments under the penny system; the labours of the ledger keeper would be diminished by a slight reduction of figures requisite, and by the extra facility afforded him in additions, whilst the merchant or trader, dealing with countries employing a Decimal System of accounts (and the bulk of our foreign trade lies with such countries), would find that in place of his present intricate calculations he would be enabled to reduce his accounts to a matter of simple per-centage, owing to the decimal multiples of the penny approximating so closely to the coins of those countries.

64. I am decidedly of opinion that it would be found impracticable to make any system of Decimal Coinage adapt itself advantageously to our present system of weights and measures. If we allow our weights and measures to remain as they are, or if we allow the principles involved in their divisions to continue in force, do not disturb our coinage.

65. The more I consider the question, the more satisfied I become with the advantages, for the general purposes for which coins are employed, of our existing system, and the less reason I see for introducing the Decimal System, especially in a partial and incomplete manner. I think by far too much stress has been laid on the saving of time in education which it is supposed a Decimal System affords. I consider the attention which must be given in our schools to that portion of arithmetic termed "compound" by no means thrown away or misspent. The chief object of all education is to quicken children's perceptions, to brighten their intellects, and to fit them for the stern battle of life in the peculiar position in society in which they may be placed, and I consider our existing system is eminently qualified for effecting this end, inasmuch as it compels our children to think and reflect; decimal arithmetic diminishes the cause for a healthy exertion of the mind, and would reduce our children to be mere machines.

The United States have a partly Decimal and partly Non-decimal System, France has a purely Decimal System, and if we are to judge of the advantages attending education in the respective countries by the results exhibited in the all-important point of social progress, we will, I think, find that we have no cause to shrink from a comparion, or to regret the absence here of a Decimal System.

ROBERT SLATER, Jun.

104, Fore Street, London, 1st May 1857.

(*Communicated by Lord Overstone.*)

J. B. Smith, Esq., M.P.

J. B. SMITH, Esq., M.P.

Answer to Question 1. Our present system of coins is well adapted to a binary or duodecimal system of weights and measures.

4. Coins are for the purpose of facilitating retail payments. They are not necessary as instruments of accounts. In Canada they have no coins representing the money of account. Accounts are kept there in *£ s. d.* Halifax currency, the only coins circulating being British and American. This has been felt an inconvenience, and the Legislature have just passed an Act adopting the American system of coinage—dollars and cents, the dollar being also hereafter the unit of account—instead of Halifax currency.

6. It is desirable to have a coinage representing the money of account.

7. Yes.

8. The Decimal System does not admit of so great a number of divisions as the duodecimal, but that disadvantage must be set against the advantage which the Decimal System possesses of greater facility in calculations.

11. Those who have been accustomed to the use of the Decimal System say that it is more favourable to distinctness of conception, the facility of recollection, and readiness and ease in mental calculation, than our own system.

12. The mil system is not a Decimal System such as has ever yet been established. It puts an extinguisher on mental calculation, except to here and there a genius like Bidder.

Try 30 pence as simply 3·00 francs, or by any other name you choose to call a tenpenny piece, and the calculation will be even more easy than 30*d.*

Under a Decimal System, Price's candles would for convenience be made into 10lb. boxes, which, at 11*d.* per lb., would cost 11 francs. 1 lb. would therefore cost 1·10, quite as easy a calculation as by shillings and pence.

13. The defectiveness of a Decimal System of coins in combination with a duodecimal system of weights and measures is obvious, and this is the defect of the American system.

14. A striking illustration of the difficulties of the mil system. How many persons out of a hundred would be able to tell off-hand how much 883 mils are?

16. Certainly not.

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17. Not without subjecting purchasers of all commodities, and especially those who make the greatest number of purchases of small quantities,—the working classes,—to great inconvenience, and the loss of fractions on almost every purchase.

No.

18. A rational Decimal System would, but a mil system would only complicate reckoning.

23. Of course this appears to me to be unanswerable.

24. Quere, whether a duodecimal division be not more educational than natural. In countries where the Decimal System obtains, people's thoughts and habits, in matters of weights, measures, and coins, take a decimal turn; they don't talk of thirds, eighths, and twelfths. In America it is natural they should do so, because their weights and measures are like our own.

26. Undoubtedly.

27. A Decimal System of weights, measures, and coins ought to go hand in hand. Unless this plan be adopted, the public will be subjected to all the inconvenience of change from the present to a Decimal System twice over: first, in the change of coinage; second, in that of the weights and measures.

28. Nothing gained, but much lost by public inconvenience.

29. It is surprising that America has so long submitted to the loss arising from a Decimal System of monies and a duodecimal system of weights and measures. It is said that some shopkeepers pay their rent out of the gains in the fractions on their retail transactions.

30. Not if you have decimal coins.

32. The country ought to decide either to adopt a system of decimal measures, weights, and coins simultaneously, or to remain as we are.

33. It is unfortunate that the consideration of the adoption of a Decimal System of weights, measures, and coins has not hitherto been taken together. The Committee to whom the consideration of weights and measures was referred recommended the present system in preference to a Decimal Scale, and probably it was a wise recommendation per se; and now a Commission is appointed to consider the propriety of adopting a Decimal System of coins without reference to a Decimal System of weights and measures, and this Commission may with equal propriety adopt a similar conclusion. But this is after all only evading the real question of any public interest, which is not whether it would be useful and expedient to adopt either without the other, but whether the public would be benefitted by the adoption of a combined system of decimal weights, measures, and coins, instead of our present system.

34. I doubt if there be any *instinctive* tendency to adopt either a Decimal or a Binary System. The English and Americans, who for ages have been born and bred to think of no other than a binary mode of calculation, may mistake this for instinct, and the Chinese, who from time immemorial have reckoned by decimals, and who possess a facility of calculation by this method which astonishes an Englishman, may be said to have an instinctive tendency to the Decimal System.

36. The convenient use of the shilling in America arises from their weights and measures being like our own, and their coins decimal.

Par. 3. Unquestionably it will, unless you decimalize your weights and measures.

Par. 4. They will not be wanted with decimal weights and measures.

Par. 6. The tradesman would gain by a system of Decimal Coins with the existing weights and measures. The small purchasers would be the greatest losers.

37. Par. 2. No. See answers to Nos. 13, 17, 23, 29, 36.

43. The suggestion of a unit which is an approximation to that of the United States is also suggestive of regret that the present inquiry did not embrace a wider field; whether, viewing the signs of the times, and looking forward to the enormously increasing intercourse between the different nations of the world (our own foreign trade has doubled within the last ten years) arising out of the facilities afforded by steam and the electric telegraph, if it be desirable to make any change at all in our existing system of monies, weights, and measures, some attempt should not have been made to combine all nations in assimilating their monies, weights, and measures. If this question were fairly grappled with it might be found less difficult than is at first sight apparent.

1 American dollar is nearly 100 English halfpence;
1 Frankfort florin „ 2 English ten pennies;
1 Indian rupee „ Half a dollar;
1 French franc „ 1 English ten pence.

The monies of Germany, France, America, and India (a large portion of the trading world) approximate to each other. Why should they not be made exactly of the same value?

France, Belgium, Sardinia, and Switzerland all use the same coins, weights, and measures. Holland, Frankfort, Bavaria, Wurtemburg, Hesse, Baden, Nassau, &c., all use the same coins. There is an evident desire for assimilation. Canada has just decided to assimilate her monies to those of the United States. A congress has assembled to consider the assimilation of the monies, weights, and measures of all the states in Germany. An association is formed in the United States to promote an international system of monies, weights, and measures, and similar associations are formed in France, England, and other countries.

46. A decimal system of money founded on the tenpence as the unit of account appears preferable to that of the sovereign or mil system, inasmuch as being founded on the penny it might be adopted immediately without any change in our existing coinage, the shilling then passing for 1·20, or one franc and twopence, or 20 centimes. Tenpenny and fivepenny pieces might be coined as shillings and sixpences are worn out.

48. No.

52. Certainly.

53. The system of monies and weights and measures in America do not harmonize. The fractions of prices of cotton, &c. quoted, viz., $\frac{1}{8}$, $\frac{1}{4}$, $\frac{5}{8}$, $\frac{3}{4}$, cents harmonize with the weights by which these

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articles are sold. In France you see cotton quoted in francs and centimes, because the monies and weights are both decimal. So the quotation of the French funds are not in thirds and eighths, but 69·33, 69·13, as the case may be.

63. It appears to me the mil system will be equally puzzling to the higher and lower classes.

J. B. SMITH.

105, Westbourne Terrace, 11th May 1857.

(*Communicated by Lord Monteagle.*)

J. R. Snowden, Esq., Director of the Mint, U.S.

LETTER from JAMES ROSS SNOWDEN, Esq., to Lord MONTEAGLE.

SIR, Mint of the United States, Philadelphia, July 30, 1857.

I HAVE the honour to acknowledge the receipt of your favour of the 11th of April last. It came to my hands through the Department of State, where Lord Napier, to whose care it was addressed, had placed it.

I am gratified to learn that my former communications were satisfactory on the points presented to my consideration. I take pleasure in making the further responses which you desire.

It was my first intention to present a general view of the subject; but on further consideration I deemed it to be more satisfactory to reply to each of the interrogatories prepared by your colleague Lord Overstone. These replies I herewith enclose.

By reference to my answer to the 23d query, you will observe that the suggestion you speak of respecting the use of coins representing the fractional parts of the dollar is inaccurate. These coins were in general use in the United States before the Act of Congress of 1792 was passed for establishing a Decimal System of Coinage and Accounts. They thus preceded the Decimal Coinage; and instead of being regarded as aids to that system, as is suggested, they have been serious hindrances to it. Until a very recent period these binary coins entered largely into our circulation. This was occasioned in some measure because our people were accustomed to their use, and also because until the year 1853 the Mint issued but few silver coins of the smaller denominations except the three-cent piece, the issues of which were commenced in 1851. One of the principal objects of the recent Act of Congress to which you refer (Act of Feb. 21, 1857) was to retire from circulation these fractional coins which thus interfered with our Decimal System. I may, however, remark, that the law also provides for the issue of a new cent of less weight, composed in part of nickel, as a substitute for the cumbrous copper cent heretofore issued, and it repeals all laws heretofore passed making certain foreign coins a legal tender in payment of debts.

I beg leave to observe, that the general scope of Lord Overstone's inquiries seems to evince an inclination to call in question the propriety of a Decimal Arithmetic as well as a Decimal Coinage. But surely no argument is necessary to prove the advantages of a decimal over a compound system of arithmetic. In my early youth I well remember, when computing sums in compound arithmetic, how delighted I was when the shillings and pence, or ounces, pennyweights, and grains, were disposed of, and the pounds were reached, in which the advance was made by tens. I suppose everyone's experience is of like character. Custom, however, renders easy propositions otherwise difficult. On this principle Lord Overstone says, "We at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*" The decimalist might well ask, how we at once know this? Certainly one unpractised with shillings and pence is compelled to make a calculation to reach that result, involving the following figures:—the half of 7 is 3 and one remaining, and as 1 shilling contains 12 pence, add 6 to 12, which is equal to 18, the half of which is 9, therefore the half of 7*s.* 6*d.* is 3*s.* 9*d.* Is it not easier to calculate that the half of 90 is 45, or the half of 100 is 50? Any selected cases which present apparent advantages of compound arithmetic over decimal arithmetic are illusory; and if more readily calculated, it is the result of custom and habit, and does not arise from any advantages possessed by the former system over the latter. The same remark also applies, I think, to Decimal Coinage.

As I regard with lively interest your efforts to reform your present system of coinage, I will be happy to respond to any further communications your Lordship may find it convenient to make.

I have the honour to be, with great respect,
Your Lordship's obedient Servant,
JAMES ROSS SNOWDEN,
Director of the Mint.

The Lord Monteagle,
&c. &c.

ANSWERS.

Mint of the United States, Philadelphia, July 30th, 1857.

IN compliance with the request of Lord Monteagle, the Director of the Mint of the United States herewith submits his replies to the series of questions, sixty-five in number, which were prepared by Lord Overstone "with the view of bringing under distinct notice and examination some of the advantages of the present system of coinage in Great Britain, and some of the objections and difficulties which have been suggested with respect to the proposed introduction of the decimal principle."

JAMES ROSS SNOWDEN,
Director of the Mint.

I.

QUESTION.

1. Do you think any change in our present system of coins desirable?

ANSWER.

A change in the system of coins of Great Britain is deemed desirable.

QUESTION.

2. On what grounds does your objection to our present system of coins rest?

ANSWER.

The main objection to them is, that they do not represent values in conformity to the decimal notation of numbers.

J. R. Snowden, Esq., Director of the Mint, U.S.

QUESTION.

3. Do you consider them as defective or inconvenient for any of the purposes of retail transactions, *i. e.* for paying or receiving? Or is your objection restricted to the inconvenience of our present coinage for the purposes of account keeping and calculation?

ANSWER.

They are objectionable in both particulars. A system defective for the purposes of account-keeping and calculation must also be so for purposes of retail transactions, *i. e.*, for receiving and paying, since such retail transactions, if analysed, involve calculations of the same nature as are required in account-keeping, viz., the mental addition, subtraction, multiplication, and division of values represented in money.

QUESTION.

4. What do you consider to be the primary purpose of coins? Do you consider them as fractional subdivisions of the integer created for the purpose of adjusting retail payments? or do you consider their primary character to be that of instruments, the purpose of which is to facilitate accounts and calculation?

ANSWER.

Both objects are indispensably necessary, and it is difficult to conceive that either could be sacrificed. A system of coins unfitted to adjust retail payments would be an unendurable evil; while it is possible to conduct commercial transactions with instruments very inconvenient for purposes of accounts and calculation. The first purpose might therefore be considered primary. Nevertheless we should only be satisfied with a system combining both the advantages indicated in this query.

QUESTION.

5. If one of those purposes must to some extent be sacrificed or made subordinate to the other, which do you think is entitled to the priority in our estimation?

ANSWER.

See the foregoing answer.

QUESTION.

6. Is not the coinage chiefly concerned in the process of buying and selling by retail? and must not the question of the merit or demerit of any system of coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments? Are you aware of any complaint against our present system of coins in this respect?

Is not *the use of coinage*, that is, the fitness of the coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small payments which arise, the consideration of primary importance, rather than the improvement of a system of account keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

ANSWER.

The answer to the third query furnishes the basis of a reply to this question. All transactions of commerce are matters of account. They do not lose their character by being exclusively mental or unrecorded, as is the case in retail dealings. And as long as our system of arithmetic, in the notation of numbers, is decimal, it may be anticipated that contradictory systems, whether in the notation of values, weights, or measures, will be found sources of constant inconvenience in arithmetical reckonings.

II.

QUESTION.

7. Do you recommend the introduction of the *decimal* principle into our coinage?

ANSWER.

Yes.

QUESTION.

8. Is it not impossible under the Decimal System to break the integer into as many clear fractional parts as we now obtain under our present system of coins?—Do you not consider that this is an objection to the Decimal System?

ANSWER.

It is impossible, if we regard the Decimal System in its technical meaning, but not so if we take the simple multiples as applicable to it. I consider the force of this objection to apply to the Arabic notation of numbers, in which we reckon by units up to ten, &c. We may assume that this plan of notation is unalterable; and if so, the conclusion seems to follow irresistibly that the same system of notation should be extended to the representation of whatever other objects may be noted numerically, whether values, weights, or measures.

QUESTION.

9. In an old but very remarkable treatise on coin and coinage (Vaughan, 1675) this passage occurs:—

"Of all the numbers, twelve is the most proper for money, being the most clear from fractions "and confusion of account, which ought not to be neglected, by reason that of all other "numbers it is most divisible, being divisible into units, as all numbers are; into two "parts, as no odd number is; into three parts, as no even number is but six, and the "numbers that consist of sixes; into fourths, into which six is not divisible; and into "sixths."

J. R. Snowden, Esq., Director of the Mint, U.S.

In the memoir dictated by Napoleon at St. Helena, on the new French system, is this passage:—

" On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux facteurs 2 et 5, et " que 12 en a quatre, savoir, 2, 3, 4, et 6. Il est vrai que la numération décimale, géné- " ralisée et exclusivement adaptée au mètre comme unité, donne des facilités aux astro- " nomes et aux calculateurs ; mais ces avantages sont loin de compenser l'inconvénient de " rendre la pensée plus difficile. Le premier caractére de toute méthode doit être d'aider " la conception et l'imagination, faciliter la mémoire, and donner plus de puissance à la " pensée."

What validity is there in these considerations as objections to the introduction of a decimal system of coinage? Or, in what does the fallacy of them consist?

ANSWER.

The commendations quoted here appear to have weight, as showing the superiority of a duodecimal system of numeration. The fallacy of applying them as objections to the introduction of a decimal coinage, will appear from considering that we have irrevocably fastened upon us a decimal arithmetic ; and whatever may be the convictions of its imperfection, it is not seriously proposed to substitute a duodecimal arithmetic. Such being the case, any isolated system of notation, whether duodecimal, or octonary, or quaternary, or vigintesimal, whatever recommendations it may have, separately considered, must be radically defective from its incongruity with the received or decimal system of notation.

QUESTION.

10. Must not there be an inferiority as regards fractional divisibility in any decimal system of coins, as compared with a coinage founded on a combination of the binary with the duodecimal scale?

ANSWER.

There is this inferiority ; but the same inferiority is to be found in the decimal system of notation of all things as well as coins. Since we submit to the inconvenience in the infinite variety of other arithmetical calculations, it will be but a trifling addition to include the coins in the same system, especially as such inconvenience is insignificant when compared with the advantages derivable from the change.

QUESTION.

11. Is not there great force and truth in the remark of Napoleon, that a decimal system of dividing the integer and of expressing the fractional parts must be less favourable to distinctness of conception, to facility of recollection, and to readiness and ease in mental calculation, than a binary or than our present system ?

ANSWER.

The remark of Napoleon would be true, if we had a binary arithmetic ; but as our arithmetic, or notation of numbers, is decimal, the same mode of noting coins or values must be most " favourable to distinctness of conception, to facility of recollection, and to readiness and ease in mental calculation."

QUESTION.

12. Ex. gr.: Which is the more easy for conception, for recollection, or for addition mentally ?

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

Again ; we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 375 mils?

The half of 2*s.* 6*d.* is 1*s.* 3*d.*, but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.* 125 mils, &c. &c. ?

Take another case. Any number of yards—7, 8, or 9 yards at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 mils per yard :

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market ?

Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person in his head, without pen and ink or pencil, and in the midst of confusion ?

But try the same process upon the same sum in decimal notation, namely, as 125 mils. Will the calculation be equally simple and easy ?

Now try it in pence, namely as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy ?

Again: Price's Patent Candles are advertised in 12 lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally ? 12 lb. boxes at 5·50 mils each, how much per lb. ?

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Again:

		s.	d.	Pence.		Mils.
1 yard or lb.	=	2	6	= 30	=	124, for more easy calculation than 125 mils.
$\frac{1}{2}$ do.	=	1	3	= 15	=	62
$\frac{1}{3}$ do.	=	0	10	= 10	=	impossible.
$\frac{1}{4}$ do.	=	0	$7\frac{1}{2}$	= $7\frac{1}{2}$	=	31
$\frac{1}{6}$ do.	=	0	5	= 5	=	impossible.
$\frac{1}{8}$ do.	=	0	$3\frac{3}{4}$	= $3\frac{3}{4}$	=	impossible.
$\frac{1}{10}$ do.	=	0	3	= 3	=	impossible.
$\frac{1}{12}$ do.	=	0	$2\frac{1}{2}$	= $2\frac{1}{2}$	=	impossible.
$\frac{1}{15}$ do.	=	0	2	= 2	=	impossible.
$\frac{1}{24}$ do.	=	0	$1\frac{1}{2}$	= $1\frac{1}{2}$	=	impossible.
$\frac{1}{30}$ do.	=	0	1	= 1	=	impossible.

Now, consider the comparative convenience in making the necessary payments.

2*s.* 6*d.* is paid with one coin. How many coins will be required to pay 124 mils?

1*s.* 3*d.* is paid with two coins. How many coins will be required to pay 62 mils?

Is it not by cases of this kind that the relative convenience of different systems of coinage must be tested?

ANSWER.

I have no doubt that in the United States every one of the examples stated could be more readily worked in the decimal notation than in the compound notation. I do not include, with the latter the statements of values in pence, because these are, in fact, decimally noted. A monetary system, beginning with the penny, discarding the pound sterling, or quoting it in pence only, and ascending to a derivative coin, or unit of account of 100 pence, is a decimal system. The examples of this character cited in the query are therefore more easily worked than in the compound notation of £. *s. d.* They therefore furnish no ground of objection to a Decimal System. The examples, however, show the inconvenience of that particular decimal system which proposes to divide the pound sterling into mils or 1,000 parts. I think it proper, however, to remark, that any unfavourable inference in regard to the latter plan drawn from the illustrations in this query would probably be fallacious. We have a right to assume that the prices of the articles named have been in some degree dictated for facility of calculation under the present system, and we should expect some slight revision of prices with the same object to conform to the new system when it would be adopted. The candles, for example, might be sold at 45 mils per pound, or 540 mils to the box, or, which would be nearer the present price, at 46 mils the pound, and 552 the box. It must be conceded, however, the difficulty of naming established prices,—under the pounds, shillings, and pence system,—in the proposed new system of pounds and mils, is a sound objection to that plan of reform. It seems, in fact, the only objection. But the weight of it is greatly overborne by the many countervailing advantages which must attend any decimal system. Without being understood as expressing any preference for a system to be noted by pounds and mils, yet it would be a subject of deep regret to me if this plan, on which the friends of a decimal coinage in Great Britain seem generally agreed, should fail on any such grounds. Any decimal system is greatly preferable to a non-decimal one. But it may be well to consider that the force of the objection above referred to, namely, the difficulty of converting present prices into the pound and mil currency, does not apply to that decimal system which, beginning with the penny (or halfpenny), would ascend to a new unit of 100 pence (or halfpence). The principal, and indeed the only objection, that occurs to me to the adoption of this plan of deriving a new unit from a centesimal multiple of one of the minor recognised coins is, that it requires the sacrifice of the pound sterling as a unit of accounts. And I am well aware, from an examination of Lord Monteagle's excellent "Memorandum prepared for the Decimal Coinage Commissioners," as well as from other sources, that the pound sterling is the unit to which the people of England from habit and association are most attached. It is to be considered, however, that, under the pound and mil system, the penny must be discarded, which is also a unit of accounts in all minor transactions, and perhaps in as large a number as the pound sterling itself. It is, besides, the unit of the illiterate classes, while the pound is the unit of the better educated. As the Decimal System will require the sacrifice of one or the other of these units, may it not be wiser to select that plan which will throw the burden of the change upon the educated classes, who can better appreciate the advantages of it, rather than upon the unlearned, by whom it certainly will be misunderstood and opposed? Again, it must be considered that the pound and mil system requires the re-adjustment of all prices under the present sixpence, and to some extent of all prices less than the pound sterling; but a decimal system of pence and 100 pence (or one ducat), or of halfpence and 100 halfpence (or one dollar), would involve no change of prices whatever. It would require only the mental conception of the new unit, which, it is believed, could not be difficult, inasmuch as it is 100 of old units or coins already well understood and fixed in the mind. I refer to my answer to number 37 of the former queries (quoted number 43 of the present series) for my views formerly hinted on this subject.

QUESTION.

13. The defectiveness of any system founded on the decimal principle consists in the imperfect divisibility of its integers.

Is not the construction of coinage necessarily a divisional process? Is it not the metrical subdivision of the integer for fractional payments in connexion with retail transactions?

> "While decimal arithmetic for the purposes of *computation* shoots spontaneously "from the nature of man and things, it is not equally adapted to the numeration, "the multiplication, or the division of material substances."—J. QUINCY ADAMS, *Secretary of State Reports to Senate of United States*, 1821, p. 8.

ANSWER.

J. R. Snowdon, Esq., Director of the Mint, U.S.

Coinage may be built up by decimal multiples of smaller coins, as well as by divisions of the larger coin. The 3-cent piece of the United States, a most useful coin, is an example.

QUESTION.

14. In the following table compare the three systems, the present, the mil, and the penny system. With which does the superiority rest as regards,—

1. Number of figures used ?
2. Conciseness of expression in words or in writing ?
3. Facility for mental conception of the sum stated ?
4. Tendency to promote accuracy in copying or calling over ?
5. Facility for calculations, especially those which must be made in the head ?
6. Interchangeability at equivalent value with the coins now in use ?

£	s.	d.		Mils.		Pence.
1	0	0	=	1,000	=	240
0	17	8	=	883	=	212
0	15	6	=	775	=	186
0	9	9	=	487	=	117
0	6	3	=	312	=	75
0	5	7	=	279	=	67
0	4	10	=	241	=	58
0	3	8	=	183	=	44
0	2	4	=	112	=	28
0	1	5	=	70	=	17
4	7	0		4,342		1,044
				27 figures.		34 figures. 28 figures.

If we now proceed to subject these total sums to division, which system will be found the most convenient ?

4*l.* 7*s.*, divided by 3, 4, 6, and 12, gives the respective sums, 1*l.* 9*s.*, 1*l.* 1*s.* 9*d.*, 14*s.* 6*d.*, 7*s.* 3*d.*

Pence 1,044, divided by 3, 4, 6, and 12, gives the respective sums of 348 pence, 261 pence, 174 pence, 87 pence.

But 4,342 mils is not divisible without a remainder by any of these divisors.

ANSWER.

To a person familiar with the present British system the first column would probably best fill all the conditions ; even facility of mental conception (No. 3), as a matter of course, attaches to that system to which one is accustomed. But to an American the statement in pence is most satisfactory in all particulars, including facility of mental calculation, since, estimating the penny at 2 cents, a doubling of the amount gives the value, nearly, in dollars and cents.

QUESTION.

15.

			s. d.		Pence.		Mils.
1	£	=	20 0	=	240	=	1,000
$\frac{1}{2}$	£	=	10 0	=	120	=	500
$\frac{1}{3}$	£	=	6 8	=	80	=	—
$\frac{1}{4}$	£	=	5 0	=	60	=	250
$\frac{1}{5}$	£	=	4 0	=	48	=	200
$\frac{1}{6}$	£	=	3 4	=	40	=	—
$\frac{1}{7}$	£	=	—	=	—	=	—
$\frac{1}{8}$	£	=	2 6	=	30	=	125
$\frac{1}{9}$	£	=	—	=	—	=	—
$\frac{1}{10}$	£	=	2 0	=	24	=	100
$\frac{1}{11}$	£	=	—	=	—	=	—
$\frac{1}{12}$	£	=	1 8	=	20	=	—
$\frac{1}{13}$	£	=	—	=	—	=	—
$\frac{1}{14}$	£	=	—	=	—	=	—
$\frac{1}{15}$	£	=	1 4	=	16	=	—
$\frac{1}{16}$	£	=	1 3	=	15	=	—
$\frac{1}{17}$	£	=	—	=	—	=	—
$\frac{1}{18}$	£	=	—	=	—	=	—
$\frac{1}{19}$	£	=	—	=	—	=	—
$\frac{1}{20}$	£	=	10	=	12	=	—

By this table it appears that going down as far as the shilling the £ is divisible under our present system, and under the penny system, into eleven distinct aliquot parts ; whilst under the mil system it is divisible only into six aliquot parts.

But observe further the subdivisibility of the quotients obtained under the present and the penny system, compared with those obtained under the mil system.

The $\frac{1}{8}$ £ represented by 2*s.* 6*d.* or 30 pence, or 120 farthings, is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, giving respectively 1*s.* 3*d.*, 10*d.*, 7$\frac{1}{2}$*d.*, 6*d.*, 5*d.* &c. ; whilst the same sum, represented by 125 mils is divisible only by 5 and 25, giving as the result 25 mils and 5 mils.

Again : the $\frac{1}{10}$ £, represented by 2*s.* or 24 pence, or 96 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48, giving respectively 1*s.*, 8*d.*, 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1$\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, and $\frac{1}{2}$*d.* ; whilst the same sum, represented by 100 mils, is not divisible into a third or an eighth part, or any of their subdivisions.

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The same may be said again of the shilling, which, represented by 12 pence or 48 farthings, may be divided by 2, 3, 4, 6, 8, 12, 16, 24, giving respectively the sums 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1½*d.*, 1*d.*, ¾*d.*, ½*d.*; whilst the same shilling, represented by 50 mils, is divisible only by 2, 5, and 25, giving the sum 25 mils, 5 mils, and 2 mils.

Now let us compare the three systems with reference to the number of figures requisite for stating the fractions of a £ which are obtainable under each of the three systems:—

		s. d.		Pence.		Mils.
1 £	=	20 0	=	240	=	1,000
½ £	=	10 0	=	120	=	500
¼ £	=	5 0	=	60	=	250
⅕ £	=	4 0	=	48	=	200
⅛ £	=	2 6	=	30	=	125
1/10 £	=	2 0	=	24	=	100
1/20 £	=	1 0	=	12	=	50
		2 4 6		544		2,225
		19 figures.		19 figures.		25 figures.

ANSWER.

I consider the notation in pence as a decimal system, and consequently these examples furnish no objection to decimal coinage *per se*, but only to the plan of pounds and mils. But it seems after all of very little consequence whether the particular fraction of a pound indicated can be represented in even mils. If you have the means of noting and paying $\frac{1}{1000}$th of a pound, and every multiple of that amount up to 999, it seems hypercriticism to object that every part of a pound, as for example the $\frac{1}{16}$th, cannot be exactly represented in mils. For practical purposes, 62 or 63 mils will denote the amount which is mathematically 62½ mils. The friends of a Decimal System might respond by asking how $\frac{4}{1000}$ of a pound sterling can be represented in your present currency. As this cannot be done it constitutes at least as strong a reproach against the compound system as it is against the millesimal plan, that it cannot indicate precisely the $\frac{1}{16}$th of a pound.

III.

QUESTION.

16. Is the introduction of the decimal principle into our coinage desirable without reference to what may be the system of weights and measures in this country?

ANSWER.

A decimal monetary system, both of coinage and accounts, is undoubtedly desirable without reference to the system of weights and measures.

QUESTION.

17. Commodities are divided for the retail purposes of the market by means of our weights and measures, and the practical purpose of coins is to effect the payment for those retail purchases. Can the adjustment of our system of coinage be properly disconnected from the adjustment of our system of weights and measures?

ANSWER.

The experience of the United States shows that decimal coinage may be introduced, with the most happy results, independent of a reform in the weights and measures. We have still the weights and measures of Great Britain, and had formerly the same compound currency. It has never been suggested that we were premature in discarding the latter; though it is often regretted that we have not reformed our system of weights and measures. It may not be inappropriate in this connexion to present the following extract from my report on the operations of the Mint for the year 1853. (Ex. Doc. No. 40, 33rd Congress, 1st Session.) "It seems appropriate to my official position that I should take this opportunity to join in the urgent demand, from various quarters, for a simple, intelligible, and well-founded system of weights and measures. The Mint has done as much as it can (and in this step it has been followed by the Bank and Mint of England) in repudiating pennyweights and grains in the mode of weighing and keeping accounts, using only the troy ounce and its decimal fractions. The sanction of law had previously been obtained for doing away with carats and carat grains in the expression of fineness of gold, and of an equally cumbrous notation for the fineness of silver, substituting the simple millesimal form introduced by French assayers, and becoming general in Europe. But we are still annoyed with another standard of weight, the avoirdupois pound, with its tedious and arbitrary divisions. The establishment of a simple and uniform system, applicable to every kind of weight and measurement, is greatly to be desired, and is well worthy the attention of Congress."

QUESTION.

18. At present our system of weights and measures, and our system of coins, may be considered as binary. Can it prove consistent with public convenience to abandon the binary, and to adopt the Decimal System in our coinage, unless we have decided on the same course in our system of weights and measures?

ANSWER.

These systems are not binary in any just sense. The coinage combines the quaternary the duodecimal, and the vigintesimal scales. The weight troy counting from the pennyweight combines the vigintesimal and the duodecimal notation; the avoirdupois from the drachm includes the sexdecimal or the progression by sixteen, by twenty-eight, by four, and by twenty. The systems of measure, wet and dry, of length, area, and solidity, embrace every variety of progression, differing as widely from the notation of the coinage as from a decimal notation itself. A simple decimal coinage may lessen the annoyance of reckonings in these complex systems; but I cannot understand how it can be supposed that the non-decimal and incongruous coinage of Great Britain should facilitate the labour.

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QUESTION.

19. If the retail transactions of the community originate in a system of weights and measures, by which the hundredweight is divided into 4 quarters, the quarter into 28 pounds, and the pound into 16 ounces; and in which, again, the lineal measure, the yard, is divided into three feet, and the foot into 12 inches; will a coinage, founded on the decimal principle of division, afford a greater facility for the adjustment of such retail transactions than the coinage which now exists?

ANSWER.

A Decimal Coinage will, upon the whole, afford greater facility, though there will be exceptions.

QUESTION.

20. Take the case of an article now selling at a shilling per pound or per yard, and retailed in halves, quarters, ounces, or inches, these fractional quantities are easily and readily paid for in our present coins. But if our coinage be subjected to the decimal principle of division, will not that facility be lost?

ANSWER.

This case affords one of the exceptions referred to. But on the other hand suppose an article under the pound and mil system offered at 80 mils, here the half pound, the quarter, the eighth, and the ounce, are sold respectively for 40, 20, 10, and 5 mils, whereas at the same price in the old system, that is, 1*s.* $7\frac{1}{4}d.$ these weights could be noted in money only by the fractions $9\frac{5}{8}d.$ $4\frac{13}{16}d.$ $2\frac{13}{32}d.$ $1\frac{13}{64}d.$

QUESTION.

21. Under our present system,—

			Mils.	Pence.
1lb.	=	one shilling	50	12
$\frac{1}{2}$lb.	=	sixpence	25	6
$\frac{1}{4}$lb.	=	threepence	12·5	3
$\frac{1}{8}$lb. or 2 ounces	=	three halfpence	6·25	$1\frac{1}{2}$
$\frac{1}{16}$lb. or 1 ounce	=	three farthings	3·125	$\frac{3}{4}$

In cases of this kind will the ordinary transactions of the market be carried on under a decimal system with simplicity or convenience comparable to that which is obtained by the present system?

ANSWER.

The decimalist may suppose the price, under the pound and mil system to be 48 mils, which would give the advantages of calculation on his side. If all things were sold by the pound and at a shilling, these examples might have weight; but subjects to be computed in money, and the range of prices are of such variety, that it would be very unsafe to allow ourself to be swayed by isolated examples selected from practice under the old system. To some extent we must be guided by general and theoretic views. Among these I hold as not open to any just exception the view which assumes that, inasmuch as our system of noting numbers is decimal, and at the basis of arithmetical reckonings, every approximation to that system in the noting of other things will be found advantageous.

QUESTION.

22. Would a change from our present to a decimal system of notation and of coins secure any advantages in brevity of expression, in facility of stating accounts, in simplicity of form, in speed or accuracy of calculation, or in facility of payments?

ANSWER.

Such a change would secure a great balance of advantages over the present system it is not doubted. Any plan of decimalization would secure them; but that which ascends from the penny to a new unit of 100 pence (or from the halfpenny to the 100 halfpence) seems to be recommended by the most advantages, theoretical and practical.

QUESTION.

23. In the report of the discussion at the Institution of Civil Engineers, of Mr. Yates' Paper on the French system of Measures, Weights, and Coins, the following passage occurs (p. 60):—

> "The pound sterling, consisting of 960 farthing, admits of 19 divisions without a "remainder; but if divided into 1,000 parts, it only admits of 8 divisions. Existing "weights and measures are chiefly reckoned by 2, 4, 8, 12, 20, 24, 36, &c., which "admit of divisions by existing monies; but if a monetary decimal system be "adopted, without also adapting it to weights and measures, it must be evident that "the number of fractions will be greatly multiplied. Decimal coins will not accord "with the fractions of a pound of 16 ounces, nor with those of a yard of 36 inches. "Purchases of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, &c. of any integer could not be paid for decimally without "incurring a loss by fractions not represented by coins. Now those are precisely "the quantities in which the working classes principally make their purchases; "consequently they would be the chief sufferers by the introduction of a decimal "coinage, unless there is a simultaneous adoption of decimal weights and measures. "This anomaly was severely felt in the United States, and to obviate the inconve- "nience, Spanish pieces of $6\frac{1}{4}$ and $12\frac{1}{2}$ cents, although illegal coins, were of necessity "employed."

Must the truth and force of this statement be admitted, or, if not, what answer can be given to it?

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ANSWER.

It would be certainly desirable that decimalization of weights and measures should be introduced as well as of coinage, and it must be conceded that the full advantage of the latter will not be manifest until the former has also been effected. To the statement made in the extract the following criticism may be offered. It assumes that weights are to be divided. But these transactions are small in number compared with those in which they are to be multiplied by the price, and in such cases the facility offered by decimal coinage is indisputable. And where division takes place the whole force of the objection is, that fractions of a mil not represented by coins must be discarded. But fractions of a farthing are also to be discarded, and why not those of a mil, which is a smaller coin? It is a mistake to suppose that in the United States Spanish pieces were employed from any necessity of preventing losses of fractions of a cent. This curreney was in existence before the adoption of our decimal coinage, and it represented prices in the £ *s. d.* system. The $\frac{1}{8}$th of the dollar, for example, was the shilling of New York, the 9*d.* of Virginia, the 11*d.* of Pensylvania. After the adoption of the Decimal System, in the absence of any other small coin (the Mint making but little progress in the issue of any other pieces than the cent and half-dollar), this Spanish money was retained, and the prices of small things were conformed to it. They were not necessary to help the imperfections of the decimal coinage, since they preceded it. And it may be added, that within a period of five months, simply in virtue of an Act of Congress, declaring that thereafter Government officers should receive them only at 20, 10, and 5 cents, but leaving their circulation and valuation optional in other cases, they have almost entirely disappeared from the currency. Large amounts of them have been deposited at the Mint at their value per ounce in weight, and at considerable loss to the holders. Had the popular judgment deemed them necessary or even convenient, this result could not, of course, be obtained. And it may be observed, that this banishment of these coins has taken place although prices, in many cases, still continue to conform thereto; but in this particular also, a reform is in progress, and I have full confidence that but a short period will elapse before the prices of retailed articles will be quoted as well as liquidated in even cents.

QUESTION.

24. In the retail transactions of the shop or market, is not division into halves, quarters, thirds, eighths, twelfths, &c. more convenient, and more in unison with the natural habits of mankind, than the division into tenths?

> "The decimal numbers, applied to the French weights and measures, form one of its "highest theoretic excellences. It has, however, been proved by the most decisive "experience in France, that they are not adequate to the wants of man in society, "and, for all purposes of retail trade, they have been formally abandoned. The "convenience of decimal arithmetic is in its nature merely a convenience of calcula- "tion; it belongs essentially to the keeping of accounts, but is merely an incident "to the transactions of trade. It is applied, therefore, with unquestionable advantage, "to monies of account, as we have done; yet, even in our applioation of it to the "*coins*, we have not only found it inadequate, but in some respects inconvenient. "The divisions of the Spanish dollar, as a coin, are not only into tenths, but into "halves, quarters, fifths, eighths, sixteenths, and twentieths. We have the halves, "quarters, and twentieths, and might have the fifths, but the eighth makes a fraction "of the cent, and the sixteenth even a fraction of a mil. These eights and six- "teenths form a very considerable proportion of our metallic currency; and although "the eighth, dividing the cent only into halves, adapts itself without inconvenience "to the system, the fraction of the sixteenth is not so tractable; and in its circulation, "as small change, it passes for six cents, though its value is six and a quarter, and "there is a loss by its circulation of four per cent. between the buyer and the seller. "For all the transactions of retail trade, the eighth and sixteenth of a dollar are "among the most useful and convenient of our coins; and, although we have never "coined them ourselves, we should have felt the want of them, if they had not been "supplied to us from the coinage of Spain."—QUINCY ADAMS'S *Report to Senate of United States*, 1821, p. 81.

ANSWER.

The fact of the easy banishment of the Spanish money with the entire approval of the people, proves that Mr. Adams had misconceived the causes which retained this currency. To the question propounded, it must be conceded that the mode of division indicated is more natural than into tenths; but the inference to be drawn is, that we should have a duodecimal notation of numbers. Since, however, we have a decimal notation, and are likely ever to retain it, contradictory scales, whether in coinage, weights, or measures, should be dispensed with, as incongruous and necessarily inconvenient.

QUESTION.

25. The late Lord Ashburton, in a debate in the House of Commons, on this subject, remarked, "That the capacity of division by halves and quaters which attends our shillings is "extremely convenient for the common purposes or life, which upon the whole is the "best criterion of any system." Is this correct or otherwise?

How is the shilling expressed as 50 mils to be divided into quarters, or the sixpence expressed as 25 mils to be divided into halves?

ANSWER.

In such cases we, in the United States, would note (in accounts) the $\frac{1}{2}$ or $\frac{1}{4}$ of the mil. See my reply to No. 36 of former queries quoted in No. 29 of the present.

QUESTION.

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26. It is stated by Sir John Herschel, in his evidence before the Committee of the House of Commons, (qu. 594,) that in his opinion "it is a great misfortune that decimal coins will "never fit the fractions of a yard and of pounds and of measures." Must we concur in that opinion, and if so, must we concur in the further view of Sir John Herschel that, "a decimal system of weights and measures, as well as of coins, ought to form a "part of the same integral system?"

ANSWER.

It would be desirable that other systems should be decimalized as well as coinage, but there seems no necessity that one reform should wait upon the other.

QUESTION.

27. In the evidence given before the House of Commons' Committee, Sir John Herschel gives his opinion, that the decimalization of weights and measures and of coins should go hand in hand (qu. 598); but if that be impracticable, he inclines to the opinion that decimalization of weights and measures should be a step towards that of coinage (qu. 600).

Professor De Morgan would adopt a decimal coinage first, leaving the other (decimal weights and measures) for a future period (qu. 765).

Mr. Airy thinks the adoption of a decimal system of weights and measures desirable to some extent, and probably concurrent with the binary system (qu. 481).

What is the correct view on those points? Is the adoption of a decimal system of weights and measures essential to the efficiency and usefulness of a decimal coinage? Ought it to precede, to accompany, or to follow, as a necessary consequence, the introduction of decimal coinage?

ANSWER.

See previous answer, and that to query 16.

QUESTION.

28. Is it not the fact that, next to addition, the most important operation performed on numbers representing broken sums of money, is the finding the price of a broken quantity of material when the price of a given unit of the material is a given broken sum?

Is not this operation in theory the multiplication of a broken quantity of material by a broken sum of money? Is it not usually performed, and with great facility, by the rule denominated "Practice?"

Is it not the fact that one of the great advantages of a completely decimal system of money, weights, and measures, would be that such operations would be performed by simple multiplication?

Is it not the fact that this result would not be attained unless weights and measures were decimalized as well as money?

If money alone were decimalized, would not such operations be still performed by "practice," and would the operations be much or at all simplified?

Take, for example, the following case, given by Sir Charles Pasley in his evidence before the Committee of the House of Commons, as showing the advantage of the Decimal System.

215 tons 17 cwt. 3 qrs. 9 lbs. at £9 11*s.* 6¼*d.* a ton?

Under the present system we should say—

215 tons 17 cwt. 3 qrs. 9 lbs.

		£	*s.*	*d.*
at £1 per ton	=	215	17	10 — $\frac{1}{28}$
at £8 „	=	1,727	2	8 — $\frac{2}{28}$
at 10*s.* = $\frac{1}{2}$	=	107	18	11 — $\frac{1}{56}$
1*s.* = $\frac{1}{10}$	=	10	15	10 $\frac{7}{10}$
6*d.* = $\frac{1}{2}$	=	5	7	11 $\frac{3}{10}$
¼*d.* = $\frac{1}{24}$	=	0	4	6
at £9 11*s.* 6¼*d.*	=	£2,067	7	8½

If weights and measures as well as coins were decimalized, the question might be:—Required the price of 483,597lbs. at £4·275 per 1,000lbs.? which would be a question of simple multiplication.

But if only coins were decimalized, then in the pound and mil system we should have 215 tons 17 cwt. 3 qrs. 9 lbs. at £9·576 per ton, which we should probably work in the following manner:—

100 tons	=	957·600
100 „	=	957·600
10 „	=	95·760
5 „ $\frac{1}{2}$	=	47·880
10 cwt. $\frac{1}{10}$	=	4·788
5 „ = $\frac{1}{2}$	=	2·394
1 „ = $\frac{1}{10}$	=	·478·8
1 „ = 1	=	·478·8
2 qrs. = $\frac{1}{2}$	=	·239·4
1 „ = $\frac{1}{2}$	=	·119·7
7 lbs. = $\frac{1}{4}$	=	·029·925
1 „ = $\frac{1}{7}$	=	·004·275
1 „ = $\frac{1}{7}$	=	·004·275
215 tons 17 cwt. 3 qrs. 9 lbs.	=	£2,067·377

Is much or anything gained in this case *unless weights and measures as well as coins* are decimalized?

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ANSWER.

Worked according to the rule of practice, the solution by the pound and mil system appears the most expeditious and simple. In the United States such an example would be solved by first finding the price per pound corresponding to the price per ton, that is, by dividing the price by 2240. The weight sold, reduced to pounds, would then be multiplied by the price per pound thus divided. The product would be the cost of the iron.

QUESTION.

29. Will not the introduction of a decimal system of coins and accounts necessarily tend to render the present system of weights and measures very inconvenient, and thus to force the country into the application of the decimal principle to weights and measures for the sake of necessary correspondence with the coinage?

"The concurrent use of non-decimal division of commodities with a decimal coinage "tends, in reckoning prices, to a result expressed in a binary fraction of a cent. In "such cases, if payment be made, three-fourths of a cent is liquidated with a cent.; "a half-cent is sometimes paid the same way, sometimes not noticed. The quarter "cent is not liquidated. In accounts the three-quarters, halves, and fourths of a "cent are generally entered, and added in on footing the columns, the total being "carried to the cents, a fraction above half a cent being counted as a cent. It is "believed that no sensible loss to either party arises in the long run from this "practice. Even in a complete decimal system of weights, measures, and coins it "would be impossible to liquidate accurately all reckonings, unless the least coin "were smaller than the public would endure."—Answer to No. 36 of Circular "Queries, by J. Ross Snowden, Director of the Mint of the United States.

ANSWER.

The decimal coinage would not render the non-decimal weights and measures more inconvenient, but, by the opportunity it would furnish for a comparison between rational and irrational systems, it would probably lead to the abandonment of the latter.

QUESTION.

30. A great practical authority, Mr. Slater, has stated that one consequence of the introduction of decimal coinage will be, that articles will be made up in parcels of ten each instead of dozens as at present. Will not this be less convenient for subdivision than the present practice of making up articles in dozens?

ANSWER.

The consequence anticipated may not follow, and in the United States it has not; but if it did, I do not perceive that any inconvenience would result.

QUESTION.

31. Does not the anticipation of the change in this respect afford a practical illustration of the tendency of a decimal coinage to force the country into the adoption of decimal weights and measures?

ANSWER.

The experience of the United States shows that decimal coinage does not force decimal weights and measures. It is certainly to be hoped that it will ultimately lead with us, and also in Great Britain, not to an enforced, but a cheerfully accepted system of decimal weights and measures.

QUESTION.

32. Is not this an inversion of the natural and proper course? Ought not the country to decide in the first instance what system is most properly applicable to weights and measures, and then proceed to adjust coinage and accounts to that system, coins and accounts being the means for adjusting and registering the retail payments which arise out of transactions which have had their origin in weights and measures?

ANSWER.

I believe that the natural course of proceeding is to do that which is practicable. If the people will understand and cheerfully accept decimalized coins, weights, and measures, the reform should by all means go that length; but if not, then decimalize that system which there is reason to believe they are prepared to adopt.

QUESTION.

33. The Select Committee of Parliament of 1821 recommended that the subdivision of weights and measures employed in this country be retained, as being far better adapted to common practical purposes than the decimal scale. If this recommendation be founded on sound reason, is it not equally applicable to the case of coinage as it is to weights and measures? Is it is not fully as true of coins as it is of weights and measures, that the present subdivision of them is well adapted to all common practical purposes?

See Evidence of J. E. Gray, Esq. (qu. 378).

Dr. Peacock, speaking of the introduction of the French metrical system, says, Encycl. Metrop. Art. Arithmetic, p. 448:—"The decimal subdivision of these measures "possessed many advantages on the score of uniformity, and was calculated to simplify "in a very extraordinary degree the arithmetic of concrete quantities. It was attended, "however, by the sacrifice of all the practical advantages which attend subdivisions by "a scale admitting of more than one bisection, which was the case with those previously "in use, and it may well be doubted whether the loss in this respect was not more "than a compensation for every other gain." Must we admit the weight of this authority and the conclusion to which it leads?

ANSWER.

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The strength of this reasoning and its conclusions are not admitted. The advantages of bisection are more than counterbalanced by the antagonism in which any system possessing them must stand to the decimal arithmetic. Duodecimal and decimal notations are incongruous. If in order to obtain the advantages of bisection, we adopt the former in certain cases, of course we must accept the outweighing inconveniences of a conflict with the latter, which stands at the base of our system of numbers.

IV.

QUESTION.

34. Is it not the fact that in all matters of abstract number and multiplication of material things there appears to be a general instinctive tendency to adopt the decimal system, whilst in dealing with material subdivisions, whether in length, capacity, or weight, there is an equally strong tendency to adopt the binary system,—the decimal system in arithmetical calculation, the binary system in weights and measures, and the retail transactions of the market arising out of them? Are not all the integers of our weights and measures multiplied decimally, but divided by the binary scale? Do we not speak of ten yards, a hundred yards, a thousand yards? But when we come to *subdivide* the yard, do we not think and speak of half a yard, quarter of a yard, &c., and similarly in all other cases?

"The earliest and most venerable of historical records extant, in perfect coincidence " with speculative theory, prove that decimal arithmetic, as founded in nature, is " peculiarly applicable to the standard *units* of weights and measures, but not to their " subdivisions or fractional parts, nor to the objects of their admeasurement or weights." —Quincy Adams's *Report to Senate of United States*, 1821, p. 16.

ANSWER.

These facts are true, and they show that a duodecimal notation would have better conformed to the wants of man than the decimal. But as the latter has been adopted, it seems manifest that the intrusion of duodecimal, binary, or other scales, if even convenient in themselves, must be inconvenient in relation to the established arithmetic. Perhaps I should explain that by duodecimal notation or numeration I refer to that in which twelve should be substituted for ten as the term of the periodical return of the unit. Under such a notation 10 would stand for 12; $\frac{1}{2}$ of 10 would be 6; $\frac{1}{3}$ of it, 4; $\frac{1}{4}$ of it, 3; $\frac{1}{6}$ of it, 2. Manifestly, the advantages of divisibility without fractions give this system a superiority over the decimal, in which 10 (selected as the term of repeating the unit) is only divisible by 2 and 5 without remainders.

QUESTION.

35. Is it not then natural and convenient that our integer of money, the £ sterling, should be similarly treated? That whilst we speak of ten pounds, one hundred pounds, one thousand pounds, we should *subdivide* the £ sterling into half a £, or 10*s.*; a quarter of a £, or 5*s.*? And, again that we should subdivide a shilling into half a shilling or 6*d.*; a quarter of a shilling or 3*d.*, and so on?—thus applying decimal arithmetic to the standard unit of our coinage, the £ sterling, but not to its subdivisions or fractional parts.

ANSWER.

Since we have a decimal notation, such an arrangement is contradictory and inconvenient.

QUESTION.

36. In the Report of the Legislative Assembly of Canada on Decimal Currency (p. 14) is the following statement:—

"The decimal currency admits of but one aliquot division—into halves; but the New " York shilling, an eighth of a dollar, can be divided into sixths, quarters, thirds, " halves. &c., and although Congress has never coined any shillings, the American " people during sixty years have clung to their well-worn shillings and sixpences, " perceiving them to be a great public convenience. Your Committee are of " opinion that coins representing the eighth and sixteenth of a dollar are indis- " pensable in small transactions in Canada, and that the smooth British sixpences " will continue to pass extensively as the eighth of a dollar unless a better coinage " is provided."

In a communication from the Rev. Joshua Leavitt of New York (p. 48 of the same Report). this further remark occurs:—

"I have no doubt of the superiority of the decimal system for the purposes of accounts, and " am astonished that other countries have so long delayed its adoption. Our experience " of the benefit of our federal currency in this respect is all one way. The saving of " time and labour is prodigious, and the advantage in point of correctness and of the " facility of detecting errors unquestionable. But for the purposes of small circulation, " in marketing, huckstering, and the like, I am persuaded that a duodecimal currency " like that of England, or like that which formerly prevailed in the city of New York, " is far preferable. These small transactions of daily life outnumber the transactions of " commerce almost infinitely. And it seems impossible to make a decimal currency as " convenient in these as the old currency. One reason is, that the decimal currency " admits of only one aliquot division, that is, into halves. The shilling can be divided " into halves, quarters, thirds, sixths, and twelfths; and if it were needed, a coin of the " value of two thirds of a shilling would be found manageable. In all these countless " small transactions which I have referred to, and in which every man is employed many " times every day, this capability of subdivision is of great convenience. We are con- " stantly buying a half of a thing, or a quarter, the eighth, the one third, and so on. If " the price is a dollar, we can make the change for one-half, for one quarter, and if one,

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"two, or more pence, with our decimal currency, but we cannot pay the exact price of "one third, one sixth, one eighth, one twelfth, or any other of the fractional parts. If "the price is half a dollar, we can only pay for one half, one fifth, and one tenth. If "the price is a quarter of a dollar, we can pay for no aliquot division whatever. This "is a constant inconvenience, and can be got along with in no other way than by "*disregarding small differences.*"

If a decimal coinage be introduced into this country, is there any reason to suppose that the inconveniences here stated as the result of practical experience in the United States will not equally occur in this country?

Will it be possible to obtain the eighth or the sixteenth of a florin, or the quarter of a shilling, or the half of a sixpence, under the proposed decimal system?

If the *small differences*, necessarily arising from this imperfect divisibility of the decimal coins must be *disregarded*, upon whom will the unavoidable loss fall?

With the tradesman will it not be an accumulating loss, consuming his profits; and will it not be impossible therefore for him to bear it?

Must it not therefore necessarily fall upon the small purchaser?

The principle of the objection is, that the decimal system substitutes the divisors 2 and 5 for the divisors 2, 3, 4, 8, 12, 16, which are the natural divisors for material things, and are also the divisors of our present money, giving us the third, fourth, and half parts of everything.

That the effect of this will be, in the sale of broken parcels of commodities, a small money remainder involving loss to shopkeeper or customer.

This, we see, is a source of constant inconvenience in the United States.

Let us take the descending steps from 8*s.*

8*s.*, or 400 mils, or 4 florins, is not divisible by 32, the divisor of $\frac{1}{2}$ oz.

4*s.*, or 200 mils, or 2 florins, is not divisible by 16, the divisor of 1 oz.

2*s.*, or 100 mils, or 1 florin, is not divisible by 8, the divisor of 2 oz.

1*s.*, or 50 mils, or $\frac{1}{2}$ florin, is not divisible by 4, the divisor of $\frac{1}{4}$ lb.

6*d.*, or 25 mils. is not divisible by 2, the divisor of $\frac{1}{2}$ lb.

In each of these cases, in the purchase of a broken quantity of material, $\frac{1}{2}$ oz., 1 oz., $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., will there not necessarily arise a broken sum of money, which cannot be paid in any coin; a small "difference which must be disregarded," to the loss of buyer or seller?

Mark how under a decimal coinage the difficulty occurs in an earlier stage, and in a more serious form, than under the present coinage, precisely as we descend to the lower amounts, to those which are the usual prevalent prices with the middle and lower classes.

If it be assumed that, instead of these prices, "competition will determine prices in decimals "conveniently divisible by 2, 4, 8, or 16," and therefore in prices not corresponding to the decimal money of account; if, instead of one shilling, or 50 mils, the price of the unit of the material is taken at 48 mils, is not this in itself an admission that in introducing decimal money we shall have introduced a money not conveniently adapted to the purposes of the market?

And in so doing shall we not have incurred a new set of objections, namely, the inconvenience of being obliged to use several coins with which to pay the 48 mils, iustead of one coin with which 50 mils may be paid?

ANSWER.

It is conceded that the use of a decimal coinage with a non-decimal scale of weights and measures, or a non-decimal division of commodities sold, tends to introduce fractions not represented by coins. But it is not perceived that any sensible loss or inconvenience to either party can arise on this account, since a fraction of a mil, which is also a less coin than a farthing, is too insignificant to be liquidated, even if there were the means of doing it. Under the present system, unliquidated fractions of the farthing must be very common. And it is unquestionably true that, while the habit of selling commodities in a binary division (the $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$,) instead of by tenths shall obtain, convenience will dictate such prices as may be divided in that way. These would be, probably, 4, 8, 12, 16, 20, 24, &c. &c. mills, admitting of the binary division sought. Nor is a great multiplicity of coins necessary to meet such sums. A three-mil coin (corresponding to our 3-cent coin) in connexion with the mil and 5, 10, and 25 mil coins, will admit of a great variety of easy payments: thus, 4 mils = 3 + 1; 8 = 5 + 3; 12 = 10 + 1 + 1, or 4 × 3; 16 = 10 + 5 + 1, or 10 + 3 + 3; 20 = 10 + 10; 24 = 10 + 10 + 3 + 1. And here I may remark, that it is a great mistake to assume that decimal coins are only such as are obtained by the decimal division of a unit, as its tenth, its hundredth, or its thousandth. Multiples of such a decimal division of the unit may fairly be included. Thus our 3-cent coin, though neither a decimal nor an even division of the dollar may as fairly be termed a decimal coin as three single cent coins may be called decimal coins. Such multiples of lower denominations play a very serviceable part in any system of coinage by facilitating change. The great utility of this 3-cent coin with us furnishes an example. Perhaps the most proper series of coins under a decimal system, would be that which would best fulfil the condition of paying all decimal amounts with the fewest possible coins. Coins divided by decimal subdivision of the unit will evidently do this in an imperfect manner. If we have pieces to represent only the 10th and 100th, prices between the $\frac{1}{100}$th and $\frac{1}{10}$th will require from 1 to 9 coins; from $\frac{1}{10}$th to $\frac{2}{10}$ths, we should need from 1 to 10; from $\frac{2}{10}$ths to $\frac{3}{10}$ths, from 2 to 11, &c. &c. Intermediate coins will therefore be demanded in practice, and in the selection we may be guided by convenience alone, subject only to the rule that no piece should indicate fractional parts of the smallest coin adopted in the scale. Thus a series of coins in the following order proceeding from the thousandth of a £ would probably be found advantageous in reducing to a minimum the number of pieces required to liquidate prices: viz.,—

Copper.	Nickel and Copper.	Silver.	Gold.
1, 3, 5	6	10, 18, 25, 50, 100	500, 750, 1000, 5000

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QUESTION.

37. Again: Mr. Leavitt bears testimony to the admirable qualities of the decimal currency for accounts, but asserts that for small circulation and payments in marketing, huckstering, and the like, a duodecimal coinage is also wanted and preferable to the other. These small transactions of daily life far out-number the dealings of commerce. And this statement is sanctioned by the concurrence of the Committee of the Legislative Assembly of Canada.

Does not this statement distinctly point to the necessity of abandoning a duodecimal system of coinage, but of introducing, if possible, in connexion with our present system of coins, some means by which money transactions may be recorded in a decimal system of notation, thus retaining the present system of coins undisturbed, but combining with it a decimal system of reckoning or account keeping?

"Perhaps it may be found by more protracted and multiplied experience that the same "material instruments shall be divisible decimally for calculations and accounts; but in "any other manner suited to convenience in the shops and markets; that their appro- "priate legal denominations shall be used for computations, and the trivial (or customary) "names for actual weight and mensuration."—QUINCY ADAMS'S *Report*, p. 90.

ANSWER.

This result may substantially be obtained in consistency with a decimal system. Coins which shall be binary, ternary, sexagesimal, or duodecimal multiples of the smallest decimal coins would be perfectly congruous with a decimal system of accounts, and would give all necessary convenience of adaptation to the non-decimal scheme of weights and measures.

QUESTION.

38. Are not the following the primary requirements of a good system of coinage? viz.:—

1st. That the integer should be divisible into the greatest number of clean fractional parts to correspond with the endless variety of retail transactions which they are to be the means of adjusting:

2d. That these fractional parts should be expressible in the shortest and most simple form of words, and with the smallest number of figures:

3d. That the coins should be such, both in denomination and relative value, as may pass with the greatest facility in valuing or summing them up when presented in great numbers:

4th. That they should be such as may afford the greatest facility for mental conception, for recollection, and for the ordinary processes of arithmetic which the people are daily called upon to perform mentally in the tumult of the market or shop, and without the opportunity of recording them in writing:

5th. That they should harmonize with the natural tendency of mankind to subdivide commodities for retail purposes by continual halving.

ANSWER.

These requirements Nos. 1 and 5, are not admitted, as long as we have decimal notation of numbers. The necessary want of harmony, with such a system, of a coinage possessing these requirements would overbalance any supposed advantage. The other requirements appear to be best obtained by a decimal coinage.

QUESTION.

39. Is not the following a just description of the present system?

In the ultimate subdivision, where the binary division is alone useful, we have two binary steps, viz., two farthings = 1 halfpenny, two halfpence = 1 penny. In rising to the next unit, the shilling, we have again the factor 2 introduced twice, giving four 2*s.* besides the number which, next to 2, is most frequently required as a divisor, viz., 3. In rising to the next unit, the £1, we have again the factor introduced twice, giving six 2*s.* besides the prime number which, next to 2 and 3 and their products, is most frequently required as a divisor, viz., 5.

Thus giving the following table of the factors of the number of each of our present units contained in the superior units.

Farthing	2 × 2	2 × 2 × 2 × 2 × 3	2 × 2 × 2 × 2 × 3 × 2 × 2 × 5
	Penny.	2 × 2 × 3	2 × 2 × 3 × 2 × 2 × 5
		Shilling.	2 × 2 × 5
			Pound.

Does not this system fulfil to a greater degree than any other possible system some of the above requirements? Can this system be justly considered as accidental or unscientific?

There must have been some valid reason for the adoption and long retention of our present peculiar system of coins instead of the obvious plan of making the progression of coins correspond to the progression of figures according to our Arabic notation.

What is that reason? Is it to be found in the above explanation, and in the varied and infinite divisibility of the integer obtained through this system?

ANSWER.

The coinage system of Great Britain is a combination, in one system, of the quaternary, the duodecimal, and the vigintesimal notations. Practice may make it endurable, but I certainly deem it unscientific, unless our decimal arithmetic shall be conceded to be a failure.

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QUESTION.

40. Does it not necessarily follow that a system of coinage based upon a binary or duodecimal scale must answer these requirements more completely than a decimal coinage, seeing that 12 is divisible by more factors than 10, and that the quotients of such division are again more divisible under the present than under a decimal system? And does not our present coinage afford *peculiar* facilities for continued division into clean fractional parts?

41. If in place of our present division of the £ sterling, a decimal division be substituted, shall we not in many cases lose the power of obtaining an exact result?

What is the 3d, the 6th, the 12th, or the 16th part of a £ sterling under decimal division of the coinage?

Under our present system it is exactly 6*s.* 8*d.*, 3*s.* 4*d.*, 1*s.* 8*d.*, 1*s.* 3*d.*

Again, what is the 3d, 6th, 12th, and 16th part of a shilling in decimal coinage?

Under our present system it is exactly 4*d.*, 2*d.*, 1*d.*, 3 farthings.

ANSWER.

I refer to my former answers, especially Nos. 20 and 23, for an indication of my views applicable to these queries.

V.

QUESTION.

42. If it be admitted that for all ordinary retail transactions, for the purposes generally of paying and receiving, our present coinage is satisfactory, whilst the inconvenience is found to arise when we come to processes of account-keeping and calculation, does it not follow that our present coins ought if possible to be retained without any change, that some decimal system of *recording* the various sums should be introduced, and that we should decimalize our *accounts*, retaining our present *coinage* in all respects unchanged? —See No. 37.

ANSWER.

If the present coins of Great Britain could be retained in connexion with the decimalization of accounts, it would certainly prove advantageous in preventing that conflict with established prices which would, to some extent, take place under any other plan. See the reply to query No. 12.

QUESTION.

43. How far will this be accomplished by writing down all money values in the number of pence of which they consist, *ex. gr.*:—

£	*s.*	*d.*		Pence.		Mils.
1	0	0	=	240	=	1,000
0	6	8	=	80	=	333·333
0	5	0	=	60	=	250
0	3	4	=	40	=	166·666
0	2	6	=	30	=	125
0	1	3	=	15	=	62·5
1	18	9		465		1,937·499

See the following answer to No. 37 of the Circular Queries by J. Ross Snowden, Esq.:—

"*A.* The scope of this inquiry may admit of the suggestion, that if the decimalization of "the British coinage were effected by adopting, in place of the pound sterling, a new "unit of the value of one hundred of the present divisions of the pound (say 100 "farthings, halfpence, or pence), all prices and coins under the present system would "be exactly measured in the new unit and its parts, which would also be almost exactly "commensurable with the dollar of the United States. A unit of 100 halfpence, for "example, which might be called a dollar, would be equal to $1·013 of the United "States, an approximation to our unit so close, that the monies of the two countries, "under such a system, might be deemed substantially identical."

ANSWER.

If discarding the notation in pounds, shillings, and pence, all money values were written in pence, this would be for all practical purposes a decimal system, though the unit, the penny, would certainly be inconveniently small.

QUESTION.

44. Does not every decimal system of accounts necessarily consist in taking the lowest money unit, and stating in Arabic notation the cumulative amount of that coin contained in any given sum?

ANSWER.

This is substantially true.

QUESTION.

45. In the pound and mil scheme do we not take the farthing (*changed in its value* and called a mil) as the basis of the system, and then proceed to state all values in the number of these new farthings contained in that value?*

In the penny scheme do we not take, in a similar manner, the penny as the basis, but *without any change in its value?*

* Keeping accounts in farthings reduced 4 per cent. in value, as stated by Dr. Gray (385).

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In addition to this advantage, will not the statement of values by the number of pence contained in them, rather than by the number of farthings or mils, necessarily involve greater conciseness and simplicity of expression, there being only one fourth the number of pence as compared with the number of farthings in any value?

Is it not an advantage in any decimal system that it does not necessarily involve the introduction of a farthing column into all accounts, seeing that all sums under a penny are now voluntarily omitted from a sense of convenience in a very large proportion of accounts?

In those cases in which it is found desirable to introduce fractions of a penny, is there not reason to believe that it will be found more convenient to express those fractions binarily than in a decimal form, seeing that such has been the result of practical experience in the United States?

The Director of the Mint states (qu. 31). "The change has been effectual as to the use of "dollars and cents, but not of the mil, the fraction of a cent being expressed binarily."

ANSWER.

I have already remarked, in my reply to queries 12 and 15, that a system in which accounts should be kept in pence, is a decimal system, and have intimated some of the grounds why a decimal scheme, based on the penny or halfpenny, and from thence deriving a new unit of 100 times, such coin should be at least seriously considered, if it be not even entitled to a preference over all others. The penny, however, seems too large to be the smallest coin of the scale. The halfpenny, which is of the value of the American cent, is better adapted for the purpose. Binary or other fractions of it would then rarely require expression or payment.

QUESTION.

46. If the penny be taken as the lowest unit of a decimal system of accounts, and if all sums be written down in the number of pence of which they consist, will not this afford a decimal system of accounts which may be used in conjunction with and without involving any disturbance of our existing system of coinage, or changing the character of the £ sterling as the great unit of account, as the basis of our system of exchange with all the world, and as the great integer by which all our principal calculations and estimates of property and of obligations are made?

ANSWER.

If it is meant by this that it is proposed to retain the pound as a unit, and the penny as a unit, I am at a loss to see how a decimal system of accounts can possibly consist with such an intention. The pence would be written decimally, and the pounds decimally; but the progression from one coin to the other, would be non-decimal. For the old progression of 12 pence make a shilling, 20 shillings a pound, we substitute 240 pence make a pound. We should have, therefore, when adding values to use the awkward divisor 240 to convert the pence into pounds. Nothing is gained by such a plan as this. If, however, it be meant that the £ is no longer to be expressed in accounts, but pence only; that is, that 240 pence are to be written 240*d.* and not £1, the scheme is consistent and decimal. But the inconvenience of having so small a unit as the penny for all sums must be manifest, and a derivative unit of 100 pence (which might be termed a ducat, being about the value of that coin) could not be dispensed with.

QUESTION.

47. The fractions of a penny would be written as fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. Is this a disadvantage? Is it not the case, that practically in all countries, even in those in which the decimal system is most completely carried out, the ultimate subdivision of coins is binary? Is not this shown by the fact that in France, Portugal, &c., the 5-centime piece and the 5-rei piece are the lowest coins in general use or generally expressed in accounts? In the United States is not a $\frac{1}{2}$ cent universally expressed instead of 5 mils? What is the inconvenience of writing such values as fractions? Are they not as easily added in this as in a decimal form, and are they not more easily multiplied?

ANSWER.

There is no special disadvantage in writing by vulgar fractions, the parts of the smallest coin. To diminish the necessity of expressing fractions at all, the smallest coin should not be taken at too great a value, which the penny probably is.

QUESTION.

48. This system would not include fractions of the penny otherwise than as fractions. Is it desirable to incur the inconveniences of the £ and mil scheme, the abolition of our present copper coinage, the abandonment especially of the penny, &c., for the purpose of comprehending in a decimal system of notation and account-keeping the fractions of a penny, which under the present system are so seldom required, which, when required, can be so easily expressed as fractions, and which are in so many cases voluntarily omitted for the sake of convenience?

ANSWER.

See the previous answer.

QUESTION.

49. If the Decimal System is to be tried for the sake of simplicity and convenience in account-keeping and calculation, is it not the most prudent and safe course to make the trial of it, in the first instance at least, as a system of account only, without disturbing the coinage?

How far would this be accomplished by simply authorizing the expression of all sums of money in the number of pence of which they consist?

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ANSWER.

With some modifications, such as I have intimated in my reply to queries 12 and 46, it appears to me that a very practicable mode of deriving decimal money and accounts is here indicated. It might be provided, that the public accounts, bank notes, &c. should be expressed in a new money of acount denominated (we may suppose) the ducat, and in pence or hundredths of a ducat; that the values of the coins of the old system in the new moneys of account should be as follows, viz.:—

	Ducats.	Pence.		Ducats.	Pence.
Sovereign	2	40	Shilling	0	12
½ Sovereign	1	20	Sixpence	0	06
Crown	0	60	Fourpence	0	04
Half-crown	0	30	Penny	0	01
			Florin	0	24

If all accounts were written and the coins noted at these values, a decimal system of money for all useful purposes would be obtained. The relations of the coins to the new unit would not be satisfactory to those who wish the subsidiary coins to be derived by decimal division of the unit. But for practical ends, in effecting the greatest variety of payments with the smallest number of pieces, the scale is an advantageous one. Nevertheless, the coinage of a piece of gold of the value of the new unit (that is $\frac{10}{24}$ths of the pure gold in the sovereign) would be manifestly proper; to which should be added in gold, its half or a fifty cent coin (equivalent to our gold dollar, and which might be so named), and in silver, a tenpence $\frac{10}{12}$ths of the present shilling. Under such a system, the old names of the coins would doubtless continue current, which is a matter of no moment, if their decimal values be clearly understood and expressed in accounts; and this in consequence of the facility of converting old amounts into pence, and therefore into the new unit or its decimals, would give comparatively little trouble.

VI.

QUESTION.

50. If the decimal system of coinage recommended by the Committee of the House of Commons (pound and mil scheme) be adopted, will it not necessarily involve the introduction of more than two monies of account?

Will not this necessarily give rise to difficulty, trouble, and confusion?

ANSWER.

It may certainly prove inconvenient under the pound and mil system, to have the decimal part always extended to the third place.

QUESTION.

51. Is there any country with a decimal coinage in which more than two monies of account, are now in practical use?

ANSWER.

In the sense referred to in the previous query (that each coin is a money of account) I should say, that in the present British coinage, there are three monies of account, the *£ s.* and *d.*

QUESTION.

52. Is it not important, with a view to the simplicity and facility in calculation which are supposed to constitute the great recommendation of a decimal system of coinage, that there be not more than one hundred steps between the highest and lowest monies of account?

ANSWER.

It is important without doubt.

QUESTION.

53. Is not this the case in all the principal decimal coinages now in use, ex. gr., franc and centime in France, dollar and cent in the United States, &c.?

By an Act of Congress passed in the year 1792, it was ordained that "the money of "account of the United States shall be expressed in dollars or units, dimes or "tenths, cents or hundredths, and mils or thousandths."

Notwithstanding this long-existing state of the law, we are now told, upon the authority of the Director of the Mint, that in that country they "have but two denominations "of money of account,—the dollar and cent." And further, we are told "that "below the cent they do not usually reckon in mils or decimals, but in binary "fractions of a cent," that is, in vulgar fractions.

What inferences are to be drawn from these facts?

Do they indicate that, be the law what it may, in decimal coinage more than two monies of account, and more than one hundred steps between the highest and the lowest unit, are found to be practically inconvenient, and, in truth, unworkable.

And further, that the broken parts of a low unit, such as the cent in the United States and the penny in this country, are more conveniently represented by vulgar fractions than by decimal notation.

Upon what other supposition can this established departure in practice from the millesimal division of the dollar distinctly laid down by the law be accounted for?

The annexed statement deserves attention; it appeared in "The Times," April 4:—

"New Orleans, March 19.

"Cotton.—Sales to day, 3,500 bales, at an advance of $\frac{1}{8}$c., the market closing "firm. New Orleans, middling, $13\frac{1}{8}$c. to $13\frac{1}{4}$c.

"Sugar has advanced $\frac{1}{8}$c., and sells for $10\frac{1}{8}$c., to $10\frac{1}{4}$c.

"Breadstuffs quiet. Pork firm. Lard advanced $\frac{1}{4}$c.; kegs, $14\frac{3}{4}$c.

"Freights.—Cotton to Liverpool, $0\frac{3}{3}$d., and to Havre, $\frac{7}{8}$c."

The broken parts of the cent are all stated in vulgar fractions, in opposition to the law already quoted.

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These fractions, $\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{2}{3}$ $\frac{7}{8}$, can none of them be stated accurately in tenths of a cent.

In the case of a rise of $\frac{1}{8}$ cent in cotton, this, stated decimally, must be given as a rise of 1 mil or 2 mils. There is, however, a small difference; the first is too little, the second is too much. What must be the effect of this unavoidable difference, small per lb., when multiplied into the number of lbs. contained in 3,500 bales of cotton? What is the lesson to be derived from these considerations?

ANSWER.

I believe it to be the case. The inference to be drawn is, that we should seek in any decimal system, to conform, if practicable, to that which has been found desirable by the experience of other countries. Still other signal advantages should not be sacrificed for this end. If it be thought indispensable to preserve the £ unit, the fact that its decimalization would require a notation to the three places of figures in the subdivision, should not be allowed to arrest the introduction of decimal coinage. But if by a sacrifice of the £, it be deemed practical to introduce a new unit of 100 pence, the fact that in such case, the subdivision will not extend (in general) beyond the 2nd place of decimals, should have weight as an argument in favour of this plan.

QUESTION.

54. If with us the £ sterling be retained as the principal money of account, does not a subdivision into one thousand parts become unavoidable, with the addition of intermediate monies of account between the £ and the mil?

55. Will not this constitute an important difference between the decimal coinage of this country and the decimal coinages now in use in other countries, much to the disadvantage of our decimal system as regards simplicity and convenience of calculation, and especially of mental as distinguished from written calculation, which the middle and lower orders are constantly called upon to perform in their daily transactions?

ANSWER.

See previous answer.

QUESTION.

56. Under our present system is not the high value of our integer, the £ sterling, a source of great convenience and advantage, especially as compared with the lower value of the franc in France and the dollar in America,—

First, as facilitating the conception in the mind of large values, and expression of them in fewer figures and with fewer words:

Second, as admitting of a greater multiplicity of clean fractional divisions?

ANSWER.

I think the franc too small a unit, but as between the £ and the dollar, the latter has an unquestionable superiority. Its division into hundredths, gives a small coin of singular adaptation to petty transactions; better than the penny, which is rather large, or the centime, which is too insignificant. The divisibility of the £ into clean fractional parts, so far as it is dependent on its compound subdivision into 20ths and 240ths, is obtained at too great a sacrifice of other advantages, as I have already previously insisted on.

QUESTION.

57. By the adoption of the Decimal System will not this advantage be converted into a great inconvenience?

Will not our high integer, by necessitating the intervention of one thousand steps between the top and the bottom of the scale, instead of one hundred steps, as in other countries, become the source of confusion and inconvenience, and render the adoption of the decimal scale in its most advantageous form impossible with us?

ANSWER.

The inconvenience of three places of decimals, though it must be partially conceded, is, I think, too much exaggerated; but as I see no necessity of decimalizing downwards from the £, and think it would be equally, if not more advantageous, to decimalize from the penny up to a new unit, the argument here hinted I have no disposition to controvert.

QUESTION.

58. And further, will there not necessarily be a less number of clean fractional parts under a system which resolves the £ sterling into one thousand mils, than under the present system, by which it is resolved into 960 farthings, inasmuch as 1,000 admits only of fifteen divisions without a remainder, whilst 960 admits of twenty-seven divisions without a remainder; and the results thus produced are again susceptible of division under the present system, but will not be so under the decimal system; *ex. gr.*, the eighth part of 960 is 120, which is again divisible by 2, 4, &c. without remainder; but the eighth part of 1,000 is 125, which is not susceptible of further division by 2, 4, &c. without remainder?

59. In commercial, trading, and banking accounts all sums less than a penny are now omitted from considerations of convenience and saving of time in account-keeping. But under a decimal system, which divides the £ integer into mils, the fourth or mill column must in all cases be retained, as the omission of it would involve the omission of all sums up to $2\frac{2}{5}d.$ The effect of this will be an increase of 10 per cent. in the number of figures used in all such accounts. Will not this increase in the number of figures used in such accounts interfere with the brevity and simplicity of expression, and the saving of time in account-keeping, which are anticipated from the Decimal System?

60. The Decimal Scheme now under our consideration will retain the shilling and sixpence as fractional coins, but will it not destroy the peculiar advantage which now attends them, namely, their convenient divisibility? A shilling resolved into 50 mils is divisible only by 2, 5, 10, and 25; but the same shilling, resolved by our present system into 48 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, and 24.

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61. Is it not a serious objection to the proposed scheme, that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of everything which they require, and to the use of which they are well accustomed; whilst, on the other hand, it will give them the divisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use?

"A glance of the eye is sufficient to divide material substances into successive halves, "fourths, eighths, and sixteenths. A slight attention will give thirds, sixths, and "twelfths. But divisions of fifth and tenth parts are among the most difficult that "can be performed without the aid of calculation. Among all its conveniences the "decimal division has the great disadvantage of being itself divisible only by the "numbers two and five. The duodecimal division, divisible by two, three, four, and "six, would offer so many advantages over it, that while the French theory was in "contemplation, the question was discussed, whether the reformation of weights and "measures should not be extended to the system of arithmetic itself, and whether "the number twelve should not be substituted for ten as the term of the periodical "return to the unit."—QUINCY ADAMS'S *Report*, p. 71.

62. The proposed scheme involves an absolute change in the value of all the lower coins. The penny and all multiples of the penny other than six and twelve will not be interchangeable at equivalent values with the new decimal coins; and again, the two lowest monies of account in the Decimal System, cents and mils, will be uninterchangeable at equivalent value with any of the present copper coins, although these latter form parts in odd pence of a large proportion of existing contracts, especially amongst the lower classes, and constitute an immense proportion of the existing coinage.

From this cause it is anticipated by some persons that confusion and difficulty in their accounts, some unavoidable loss and injustice, and a vague but dangerous impression of more extensive injustice will arise amongst the mass of the people.

Whereas a decimal scheme founded upon the penny or the halfpenny would involve no real change in the value of any of our coins, but would only involve some additional trouble to the richer classes by giving a new numerical form to their high integer, the £ sterling, but not involving any absolute change in its value.

Do you think these apprehensions well founded, and what is your opinion of the extent and importance of this difficulty?

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher classes,—those who keep extensive accounts, and enter into larger calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multiples and subdivisions?

64. In connexion with the foregoing considerations, it has been suggested that a vast majority of the smaller money transactions in a community are not transactions of written account at all; that they arise out of retail purchases made in the market or the shop, the calculations connected with which are necessarily performed in the head, and are not reduced to writing. That for these purposes, namely, adaptation to the existing division of our weights and measures, for distinctness of mental conception and facility of calculation in the head, our existing coinage is better adapted than a decimal coinage; whilst the supposed superiority of a decimal coinage for purposes of written accounts and calculations is not applicable to such transactions, and would not prove beneficial to the great mass of the people with whom such transactions are of constant daily occurrence.

How far do these considerations constitute a just ground of objection to the introduction of a decimal coinage? or what reply can be made to them?

ANSWER.

These queries furnish arguments only against a decimal system for Great Britain, based on the pound and mil. They must be admitted to have considerable force, but I consider them altogether outweighed by the convenience which must attend any system of decimal notation, even if it be less good than another which might be selected. To the plan of decimal coinage and accounts based on the penny (to which I refer in the answer to query 49), the arguments have no weight whatever, but in fact lend support to that system.

QUESTION.

65. Looking to the considerations alluded to in the preceding questions, the superior facility of division possessed by 12, the further very convenient and almost unlimited facility of division arising from our peculiar mode of reckoning the £ integer into shillings, pence, and farthings; the harmony which exists between our fractional coins and our weights and measures, the double advantages in facility of calculation to be obtained from decimal coins unaccompanied by decimal weights and measures, and the brevity and convenience of expression, oral and written, which attaches to our present coins;—duly weighing, on the other hand, the advantage of assimilating the progression of coins to that of figures, the simplicity and facility in keeping accounts and making calculations, the saving of time in education and of labour by the substitution of simple for the proverbial inconvenience of compound arithmetic, which it is expected will arise from the introduction of decimal coinage;—

Is it on the whole prudent to make the experiment? Is the result sufficiently certain? Will the increase of convenience be sufficiently great and fairly diffused over all the classes upon which the inconvenience of the change must fall? Or must we come to the conclusion that the advantage of the change is neither so important nor so well ascertained as to justify the disturbance of our existing system, and of the habits and computations founded upon it?

ANSWER.

The considerations referred to in the latter part of this query far more than counterbalance, in my judgment, those presented in the former, and render a reform in the British system of compound money notation eminently prudent and wise. As I have already stated, I believe any decimal coinage preferable to such a compound system; but I am of opinion, that the plan of

selecting a new unit of the value of 100 of the present smaller recognized coins (say 100 pence) would present the greatest amount of advantages. In such a case, all the old prices and coins from a penny up could be exactly expressed in the new unit and hundredths, and the facility acquired under the compound system of converting all sums into pence, would reduce to a minimum the inconvenience of passing from the old to the new notation. It is not supposed that the mental conception of a new unit equal to 100 of a coin so well fixed to the habits as the penny can be difficult; certainly not more so than it will be to the humbler classes to embrace a new unit (the mil) for the expression of all sums under sixpence, abandoning the penny to which they are most accustomed as a representative of values. The 100 pence coin, while presenting these advantages, considered simply in reference to Great Britain, will probably prove especially satisfactory to the immense proportion of other countries accustomed to the dollar, our own included; since it is almost exactly commensurate by that coin, two dollars being very nearly one ducat of 100 pence. The commercial and social intercourse between Great Britain and America entitles this consideration to great weight.

J. R. S.

J. R. Snowden, Esq., Director of the Mint, U.S.

(*Communicated by Lord Overstone.*)

JAMES YATES, Esq.

James Yates, Esq.

Answer to Question 1.—Yes.

2. The use of our present system of coins causes dreadful loss of time, makes us liable to frequent mistakes in calculation, is quite insufficient for making exact payments in purchases of small amount, is to an enormous extent rejected in larger transactions, is ill adapted for computing per-centages, averages, and prices of articles sold by wholesale, estranges us from foreigners, and, as long experience shows, does not recommend itself, by any advantages of its own, even to the distant dependencies of Great Britain, and is much more unlikely to find any acceptance in countries unconnected with Great Britain.

3. My last answer shows that I consider them very defective and inconvenient in both of these views.

4. The primary purpose of coins is to pay for articles purchased. They no doubt facilitate accounts and calculation, but no one would think of keeping accounts unless he had first made payments by the aid of coins. Also, in many countries, viz., Portugal, Brazil, Hamburg, &c., the monies of account are either quite imaginary or they are to a greater or less extent independent of the coinage. I therefore consider coins, viewed in reference to their primary purpose, as either multiples or "fractional subdivisions" of the integer, intended to be used in buying and selling, which is in fact nothing but an improved kind of barter. At the same time I think it of the greatest importance that there should be a correspondence between coins and monies of account, and that the coins should bear to one another such relations as may make them serve, in the best possible manner, as "instruments of calculation."

5. I do not think there is the least occasion to sacrifice the one purpose to the other; but on the contrary, I believe that under a good system, both purposes would be attained, and that the pursuit of either would aid the attainment of the other. If a priority can in any sense be given to the one over the other, I think the use of coins for retail payments ought to have the first consideration, because they are of the first necessity.

6. Certainly. The coinage is chiefly concerned in buying and selling by retail. A good coinage ought to enable us to "adjust with readiness and simplicity the multiplied variety of small payments;" but our present system of coins does not accomplish this object. The division of the coins by 20, 12, and 4, is inconvenient, and is consequently very much avoided in practice. In retail transactions the use of the pound is generally rejected, reckonings and statements of prices being made in shillings and pence, even when the value exceeds that of a pound. In proof of this, set out to walk from Tyburn Gate along Oxford Street, Holborn, Newgate Street, Cheapside, Cornhill, and so on to the London Docks and Blackwall. Look at the prices of articles, as marked in shop windows; examine the printed and lithographed letters circulated by tradesmen; go into the shops and attend to the questions of the customers, and the answers of the shopmen; in short, use every possible way of learning whether the pound is a necessary denomination in these transactions. You will find that the pound is not mentioned or even thought of in ninety-nine cases out of a hundred. Nearly all the statements and computations, previously to the act of expressing them on paper, are by the use of shillings and pence. Having paid some attention to this matter, I have remarked, as the general result of my observations, that watchmakers, jewellers, and silversmiths, and, to a small extent, musicsellers and furniture dealers, use the pound, but no other trades, except that wine merchants use it for large quantities. They sell port at so many pounds and shillings per pipe, but at so many shillings and pence per dozen or per bottle; thus, the practice of retail traders seems to show that in general they find no advantage in the division by twenty. They find the gold sovereign convenient as a substitute for twenty shillings, but as a money of account they do better without it; and I believe they would find it easier and simpler to keep their accounts, if the pound were banished from the columns of their books. Here is a bill for two quarters of oats, expressed "as the Act directs," but it is manifest that the reduction to pounds is perfectly useless. Mr. Kent, if left to himself, prefers saying that the price of a quarter of oats is 35*s.*, not 1*l.* 15*s.*; he only reduces the amount of his bill 70*s.* to pounds, for the sake of complying with the method which law and custom prescribe in this country.

"Bought of GEORGE KENT, Highgate.

	£	s.	d.
2 qrs. oats, 35*s.* - - - -	3	10	0

So much for the higher denomination, the pound.

Let us now consider the lower, viz., shillings, pence, and farthings. To judge of their adaptation to our requirements I would propose a walk, as before, from Tyburn to Blackwall; and I will include in my inquiries, not only poor persons and those of thrifty habits, but also luxurious persons and fashionable ladies. Our present coinage does not enable them to get what they want, and to pay for it honestly; but in innumerable cases they must either take more of an article than

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they want, or pay for what they want more than its just price. They commonly practise the latter alternative. Suppose, for example, any one wishes to purchase as follows :—

	s.	d.		s.	d.
1 oz. of tea, at	3	6	per lb.	0	$2\frac{5}{8}$
2 „ coffee, at	1	7	„	0	$2\frac{3}{8}$
$\frac{1}{4}$ lb. Scotch barley, at	0	$2\frac{1}{2}$	„	0	$0\frac{5}{8}$
$1\frac{1}{4}$ yards of ribbon, at	0	$7\frac{1}{2}$	per yard	0	$9\frac{3}{8}$

The individual in question cannot fulfil his wishes by the employment of the coins now in use; for the half-farthings, though coined, cannot be obtained, certainly not without a loss by carriage and correspondence, which makes the use of them impracticable.

Besides the impossibility of paying for fractional quantities, as in the preceding examples, about 300 separate articles might be enumerated, which are manufactured so cheapiy, that they might be sold in any quantities at the rate of 10 for a penny, or even a considerably greater number for a penny, and so as to yield at this low price a profit of at least 100 per cent. to the retail dealer. I believe the introduction of a coinage capable of being used in such cases would be a great blessing to the community, and would not only add immensely to the innocent enjoyments of the family-circle, but would be very favourable to habits of sobriety, decency, and prudent economy. To explain my meaning, I will take the actual case of a poor, but decent and respectable family in Suffolk, only observing that similar examples might be produced by thousands from all parts of the United Kingdom.

"Weekly earnings and expenditure of the family of Robert Crick, a farm-labourer of Lavenham, Suffolk, as furnished by Mr. Scott, the Relieving Officer of the Union :—

Income.

Family.	Age.	Earnings. s.	d.
Robert Crick	42	9	0
Wife	40	0	9
Boy	12	2	0
Boy	11	1	0
Boy	8	1	0
Girl	6		
Boy	4		
Total earnings		13	9

Expenditure.

	s.	d.
Bread	9	0
Potatoes	1	0
Rent	1	2
Tea	0	2
Sugar	0	$3\frac{1}{2}$
Soap	0	3
Blue	0	$0\frac{1}{2}$
Thread, &c.	0	2
Candles	0	3
Salt	0	$0\frac{1}{2}$
Coal and Wood	0	9
Butter	0	$4\frac{1}{2}$
Cheese	0	3
Total Expenditure	13	9"

We may suppose these individuals to experience the following or similar desires; with our present coinage they cannot hope to satisfy them, however proper and innocent, or even commendable. Robert Crick wants a brass-headed nail to hang a picture on the wall of his cottage; his wife wants starch, or soda for her washing. The eldest boy wants to sow mustard and cress. The second wants a pen, an envelope, a sheet of paper, some ink, or a few wafers, to write a letter. The third wants a slate-pencil. The girl wants hooks and eyes, a dozen of pins, a needle, a stay-lace, a fastening for her boots, or a little thread or tape. The youngest urchin wants paper or string, that he may fly a kite. For these, and many other purposes, a farthing would be too great an expenditure; and it appears to me that a wise and humane legislation would provide for such cases in this country, as they are provided for in other countries.

In the Polytechnic Institution, Regent-Street, there is a case, exhibiting a collection of articles which are adapted to be sold for a centime.

7. Yes.

8. It is not impossible. Under the present system we have the following 15 coins :—

	£.	s.	d.
Gold	2	0	0
	1	0	0
	0	10	0

	s.	d.
Silver	5	0
	2	6
	2	0
	1	0
	0	6
	0	4
	0	3

	d.
Copper	1
	$1\frac{1}{2}$
	$0\frac{1}{2}$
	$0\frac{1}{4}$
	$0\frac{1}{8}$

Compare with this the coinage belonging to the metrical system, as now used with great and acknowledged benefit in the western parts of continental Europe. It contains 19 pieces, including the Leopold, which, though lately demonetized in Belgium, may be continued in the list on account of the very general currency of the English sovereign for 25 francs.

	fr. cts.
Gold	100·
„	80·
„	50·
„	40·
„	25·
„	20·
„	10·
Either gold or silver	5·
Silver	2·50
„	2·
„	1·
„	·50
„	·25

Silver, copper, or nickel	·20
Copper or nickel	·10
Copper	·05
„	·03
„	·02
„	·01

The comparison proves that if we are to judge by the actual practice, the Decimal System has the advantage in this respect.

9. The number which admits of division into the greatest number of aliquot parts is 60; and this was used in ancient times for the purpose and perhaps for the reason in question. It is now used in Germany, 60 kr. = 1 florin. It divides into 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60. Twelve has to some extent the same advantage, its divisions being 1, 2, 3, 4, 6, 12. On the other hand ten has only four corresponding parts, 1, 2, 5, 10. But ten has obtained the preference in modern times, as the ruling number in measures, weights, and coins, at least in the metrical system, because it coincides with the common arithmetic now adopted by all civilized nations. If this arithmetic were founded on the number 12; in other words, if the numbers, as arranged in columns in any computation, instead of denoting units in the first column to the right-hand, tens in the second, hundreds in the third, thousands in the fourth, and so on, denoted so many dozens in the second column, squares of dozens in the third column, cubes of dozens in the fourth, and all the higher powers of dozens in succession, the same argument, which is now employed to recommend the Decimal System, would then recommend the duodecimal. This argument was used by Jefferson, A.D. 1784, with a view to the improvement of the United States coinage. It has been continually reiterated on both sides of the Atlantic, and I think has lost nothing of its force. The reasoning I refer to as originally employed in support of decimal coinage is contained in Appendix No. III. of my Narrative of the Origin, &c. &c., and is here inserted,—.

"The most easy ratio of multiplication and division is that of 10. Every one knows the facility "of decimal arithmetic. Every one remembers that when learning money arithmetic he used to "be puzzled with adding the farthings, taking out the fours and carrying them on; adding the pence, "taking out the twelves, and carrying them on; adding the shillings, taking out the twenties, and "carrying them on; but when he came to the pounds, where he had only tens to carry forward, it "was easy and free from error. The bulk of mankind are schoolboys through life. Certainly, in "all cases where we are free to choose between easy and difficult modes of operation, it is most "rational to choose the easy."

During the era of Napoleon, the question was fully and attentively considered by many who were better judges than he was of such matters. Among them were practical men as well as theorists, men of business as well as philosophers. Though quite aware of the advantage of the number 12, from its divisibility by 3 without remainder, they preferred 10, because it was suited to the established arithmetic.

10. I think I have shown, in the answer to Question 8, that the franc and centime system of coins admits of as many fractional divisions as are ever required. Indeed, the divisions above enumerated are found to be rather more than necessary, a proof of which is that the 5th, 9th, and 13th are disused or demonetized in some countries, though continued in others.

11. I cannot see the force or truth of Napoleon's remark. Even admitting with him the superiority of the number 12, that does not show any advantage in 20 and 4, which are the connecting links between the pound and the shilling, and the penny and the farthing. As regards binary systems, it is to be observed that the metrical system of measures, weights, and coins is throughout binary as well as decimal. This is exemplified by the table of coins (answer to Question 8). The inventors of the system had this principle in view, and adopted the rule that each of the principal decimally related quantities should have its double and its half denoted and expressed by separate weights and coins.

I will here observe (without referring to Lord Overstone), that it is not very consistent in the opponents of the metrical system to quote the authority of Napoleon as condemnatory of it, and at the same time to assert, that he forced it on the Swiss, the Piedmontese, the Belgians, and other nations, which adopted it. I believe the fact was, that being never friendly to it, he did not promote its reception even in France, much less in the adjoining countries.

12. Not approving of the pound and mil scheme, I take the liberty of translating these English sums into francs and centimes, and I think it will be obvious at a glance which system is more easy for conception, recollection, and addition mentally.

7*s.* 6*d.*	= 90 pence	= 9	francs.
2*s.* 6*d.*	= 30 „	= 3	„
1*s.* 3*d.*	= 15 „	= 1·50	„
0*s.* 9*d.*	= 9 „	= 0·90	„
12*s.* 0*d.*	= 144 „	= 14·40	

Also, to halve the figures in the last column is the work of a moment. The argument does not here require that any notice should be taken of the difference between 1*d.* and 10 centimes.

According to my view, as I have always objected to three places of decimals, the next question will be how to reckon 7, 8, or 9 yards at 1f. 50c. or 2f. 50c., and my answer would be, that it is far easier than the English method, and that this is proved by every day's experience in the market and everywhere else.

As to the next question. I admit that the metrical system fails in respect to the division by 3, its only weak point. (Respecting 3 as a divisor, see further observations in the answers to Questions 36, 37, 38.)

Price's Patent Candles, if we had the metrical system, would be advertised in 6 kilogramme boxes at 12 francs each, which gives 2 francs per kilogramme, as seen at a glance. I will endeavour,

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as before, to convert the next table into terms of the metrical system, and, I think, the advantage will be in favour of this system as regards ease, clearness, and simplicity.

1 metre or kilogramme	=	3	francs,	payable in	2	coins.
$\frac{1}{2}$ „ „	=	1·50	„	„	2	„
$\frac{1}{3}$ „ „	=	1	„	„	1	„
$\frac{1}{4}$ „ „	=	·75	„	„	2	„
$\frac{1}{5}$ „ „	=	·60	„	„	2	„
$\frac{1}{6}$ „ „	=	·50	„	„	1	„
$\frac{1}{10}$ „ „	=	·30	„	„	2	„
$\frac{1}{12}$ „ „	=	·25	„	„	1	„
$\frac{1}{15}$ „ „	=	·20	„	„	1	„
$\frac{1}{20}$ „ „	=	·15	„	„	2	„
$\frac{1}{30}$ „ „	=	·10	„	„	1	„

The gradations are the same as in Lord Overstone's table, except that $\frac{1}{5}$ is inserted, and $\frac{1}{3}$ omitted. It will be found that the payments may be made with a smaller number of coins on this plan than on his Lordship's.

14. In making the comparison I would, as before, put francs and centimes for the English denominations, reckoning 1 franc = 10*d.* for the sake of easy comparison; and because the argument is not affected by it. I put a space between francs and centimes, as is done in the left-hand column of *£ s. d.* and omit the cypher on the right hand.

francs.	
24	0
21	2
18	6
11	7
7	5
6	7
5	8
4	4
2	8
1	7
104	4

1. The number of figures used, 28, is, of course, the same as in Lord Overstone's right-hand column.

2. The conciseness, ditto.

3. I think the franc and centime system much the easiest. I consider amounts above 100 unfit for mental conception without a break or division such as that between francs and centimes.

4, 5. I am of opinion that mental reckoning by hundreds, as in the middle column, or that of mils, is next to an impossibility. Consequently, the franc and centime system is most favourable to accuracy in copying or calling over.

6. With respect to interchangeability, I find the pound and mil quite as difficult as the franc and centime system. I am more puzzled when I try to convert shillings, pence, and farthings into florins, cents, and mils, than when I convert them into francs and centimes. Nevertheless, I should advise and expect, that tables would be commonly used for this purpose during the period of transition.

Take £4 7*s.* = 104·40 francs. Then this sum divided by 3, 4, 6, and 12, gives 34.80 francs, 26·10 francs, 17·40 francs, and 8·70 francs. Nothing can be simpler and more convenient.

15. Again, taking £1 = 24 francs, it is divisible into 11 aliquot parts, just as under the two English systems. Carrying the comparison to the lowest subdivision, the result is, that $\frac{1}{8}$ = 3 francs, is not divisible by 8, 24, or 40; but that it is divisible by 25, 50, 100, and 150, which cannot be used as divisors without remainder in the other systems, and that $\frac{1}{10}$ = 2.40 fr. is not divisible by 32, but it is divisible by 5, 10, 15, 20, 30, 40, 50, 60, 80, and 120, of which the other methods do not admit.

Also, with respect to the number of figures requisite for stating the fractions of a £, the franc and centime system is on a par with the others. Thus,—

		fr.	c.
		24	
$\frac{1}{2}$	=	12	
$\frac{1}{4}$	=	6	
$\frac{1}{5}$	=	4	80
$\frac{1}{8}$	=	3	
$\frac{1}{10}$	=	2	40
$\frac{1}{20}$	=	1	20
		53	40

19 figures.

16. I cannot think it desirable, because, if carried into effect, it would be done without reason, being merely the result of idleness, ignorance, and prejudice. Considering what has been done and is doing in many other countries, I think such a course would be disgraceful; and, if it were carried into effect, it would retard more extensive and substantial improvements.

17. The two systems cannot be properly disconnected.

18. Our systems are no more binary than the metrical system, which is, and always was, pervaded throughout by binary arrangements. See answers to Questions 11, 21, 24, 33, 34, 35, 36, 37.

19. A Decimal Coinage will be under these circumstances better adapted for calculations in regard to the coinage itself, or in adding and subtracting money; but not, beyond this, for reckoning the sums due for goods in such retail transactions.

20. The facility would be lost by decimalizing the coinage only, but increased beyond expression by adopting the Metrical System, in which measures, weights, and coins, are all decimally and most distinctly related. Let me be allowed to introduce here the opinions of Mons. Michel Chevalier in his letters to me, which I have inserted in my Narrative, page 35 ;—

April 23, 1855.

"I heartily congratulate you, dear sir, on your efforts to procure the introduction of the "Metrical System into your great nation. *You would thus render a signal service to your countrymen, who would see all their calculations simplified thereby, as if by enchantment.* It would, "moreover, be a marked approximation among civilized nations; for the adoption of the Metrical "System by Great Britain would decide the question of its adoption by the rest of the world."

"DEAR SIR, June 22, 1855.

"I have received, through your kindness, the Morning Chronicle of the 13th instant, "containing the discussion (in the House of Commons) on the Decimal Coinage. I observe that "Mr. J. B. Smith has distinguished himself by the comprehensiveness of his views. He has "rightly conceived, *that the reform would signify little, if it were confined to money, and that it "ought to include weights and measures,* so as to cement the union and harmony of civilized "nations."

21. Under the Metrical System the ordinary transactions of the market would be carried on with infinitely greater simplicity and convenience. Take Lord Overstone's data, using francs and centimes, and supposing lb. to mean half a kilogramme.

lb.		fr.	c.	lb.		fr.	c.	lb.		c.
Then 1	=	4	0	or, 1	=	1	60	or, 1	=	·16
$\frac{1}{2}$	=	2	0	$\frac{1}{2}$	=	0	80	$\frac{1}{2}$	=	·08
$\frac{1}{4}$	=	1	0	$\frac{1}{4}$	=	0	40	$\frac{1}{4}$	=	·04
$\frac{1}{8}$	=	0	50	$\frac{1}{8}$	=	0	20	$\frac{1}{8}$	=	·02
$\frac{1}{16}$	=	0	25	$\frac{1}{16}$	=	0	10	$\frac{1}{16}$	=	·01

22. Even the pound and mil system would secure considerable advantages in these respects; but the adoption of the metrical system, not only in money, but in weights and measures also, would secure infinite advantages in all these respects.

23. I fully admit the truth and force of Mr. J. B. Smith's statement in this passage.

24. The inconvenience of the partially decimal system of the United States arises from the circumstance that their unit, the dollar, is much too high, obliging them to use $\frac{1}{2}$ cents and $\frac{1}{4}$ cents.

In the answers to former questions (viz. Questions 11 and 18), I have shown that the metrical system provides for the division into halves, quarters, &c., as well as into twentieths, tenths, fifths, &c.

25. Lord Ashburton must have known that sixpenny-pieces and threepenny-pieces are not more abundant in this country than half-francs and quarter-francs on the Continent.

26. I agree with Sir J. Herschel that "a Decimal System of weights and measures, as well as of coins, ought to form part of the same integral system."

27. Thinking, with Sir J. Herschel and Mr. J. B. Smith, that "the adoption of a decimal system of weights and measures is essential to the efficiency and usefulness of a Decimal Coinage," I am of opinion that the proper course is first to determine upon a system, including weights and measures as well as coins, and then to proceed with the whole or any part of the system as quickly as possible, leaving particulars to depend on circumstances. Dr. Otto Hubner, of Berlin, a most eminent authority, is disposed to think that weights should be taken first, then coins, and measures last of all. See his letter in the Appendix to my "Narrative," p. 41.

Dr. Hodgkin, one of the Council of the International Association for obtaining a uniform Decimal System of measures, weights, and coins, who has long attended to the subject, and has had extensive opportunities of observation, wrote me the following letter previously to a meeting of the Council :—

"I am very sorry that I am quite unable to be at the meeting to-day. I therefore write a hasty note to express my strong hope that nothing may induce the meeting to give sanction or encouragement to any half measures, or in fact to any plan short of that of adopting the metric system, as authorized in many states on the Continent. The arrival at this may be gradual,—money first, weights next, and so on; but we must have no other final aim. Those who have proved the advantages and facilities of the French system can arrive at no other conclusion, and must deprecate our being obliged to unlearn our present system, and learn a new one having only limited advantages to recommend it."

28. I quite admit the force of this argument.

29. Here I will only observe that Mr. Snowden's remarks confirm what I said before (Question 24), that the United States unit is much too high. In France, and other countries adopting the metrical system, the centime is not only "endured," but considered a great convenience, and used every day to an immense extent.

30, 31. I think that this result will follow, as stated by Mr. Slater, but without the slightest inconvenience; rather the contrary.

32. If one choice must be made before the other, the natural and proper course is to fix the weights and measures first, and then to base the coinage on the weights. See answer to Question 27.

33. With great respect and regard for Dr. Peacock, it appears to me that he was quite in error with regard to the extent in which the metrical system admits of bisection. I have already expressed my opinion that in this it is not at all deficient. I will now further add, that the myriametre admits of bisection eight times, yielding by this process 39 metres, 62 millimetres, and 1 half-millimetre; and that the metrical ton admits of bisection ten times, yielding 976 grammes, 562 milligrammes, and 1 half-milligramme.

	Metres.	Millimetres.			
$2^8 = 256$	39	·0625	×	256	= 1 myriametre.
	Grammes.	Milligrammes.			
$2^{10} = 1{,}024$	976	562.5	×	1,024	= 1 ton.

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I have taken the highest and lowest denominations, commonly used both in measures and weights.

34, 35. I doubt whether any arithmetical tendencies can be properly called instinctive, nor do I understand the meaning of the term in this application. There is a tendency to binary division and multiplication, not only as the most simple but the most frequently needed, and also because it is by much the easiest, especially in division; it is much more difficult to divide any space, article, or quantity into 3, 6, 9, or 12 parts, than into 2, 4, 8, or 16. Nevertheless, there is so much irregularity, and apparent absence of principle in the actual weights, measures, and coins of all nations, with the exception of those which have adopted the decimal principle, that it seems scarcely possible to establish any rule upon the actual practice.

In answer to the last question, I observe again, that in the metrical system, the divisions are throughout binary, as well as decimal. See Answers to Questions 11, 18, 24, 33.

36, 37. To say, as is said in these extracts, that "the Decimal Currency admits of but one aliquot division, into halves," is a manifest error. It is divided into fifths.

This assertion of Mr. Leavitt's argues, that his knowledge of Decimal Coinage was at least very imperfect, probably confined to his own country, in which I have reason to think the fifth of the dollar, or piece of 20 cents is disused, or very little known. His assertions will not apply to francs and centimes.

I do not reply to the subsequent queries, because they are directed against either the United States system or the pound and mil system, both of them very defective, and which I should be sorry to see attempted in this country; but the subject of the divisibility of the coinage, or of its fitness for being divided by 2, 3, 5, and their doubles and trebles, occupies so important a place both in Lord Overstone's questions and in the Preliminary Report of the Royal Commissioners, that I am very desirous of making an accurate comparison of our present English coinage with the coinage of the Metrical System in this respect. Both coinages are exhibited complete in my answer to Question 8.

Mr. Robert Shaw's and Dr. J. E. Gray's answers to the Questions of the Royal Commissioners (Nos. 256—265, 282—286, 407,) indicate that they labour under the prevailing error of the opponents of the Metrical System in this country of supposing that that system does not provide for binary division. By referring to the writings of Prieur and others, who invented and explained the Metrical System, it will be found that they were fully aware of the great importance to be attached to division into halves, quarters, &c.; and it is impossible to examine any series of measures, weights, or coins, belonging to this system without seeing the admirable provision which is made for such modes of calculation. I have already (Question 33) produced examples in the case of weights and linear measures, showing that the bisection may be carried even to the 10th degree. I will now compare the coins so as to show their relative divisibility not only by 2, but by 3 and by 5:—

1*a*. Sums connected by binary division in the English coinage,—

£	s.	d.		s.	d.		d.	
2	0	0		2	0		4	
1	0	0		1	0		2	(2 coins)
	10	0			6		1	
	5	0			3		$\frac{1}{2}$	
	2	6			$1\frac{1}{2}$		$\frac{1}{4}$	
	1	3	(2 coins)		$\frac{3}{4}$	(2 coins)	$\frac{1}{8}$	
		$7\frac{1}{2}$	(2 coins)		$\frac{3}{8}$	(2 coins)		
		$3\frac{3}{4}$	(3 coins)					
		$1\frac{7}{8}$	(4 coins)					

In all 22 sums, represented by 32 coins.

1*b*. Sums connected by binary division in the Metrical Coinage,—

fr.	c.		fr.	c.		fr.	c.		c.		c.	
100			80			2			·20		·02	
50			40			1			·10		·01	
25			20				·50		·05			
12	50	(2 coins)	10				·25					
6	25	(3 coins)	5									
			2	50								
			1	25	(2 coins)							

In all 21 sums, represented by 25 coins.

Thus the halves are represented in proportion by a smaller number of coins in the Metrical than in the English System, showing that of the two systems the Metrical accords more with the binary division.

2*a*. Sums connected by ternary divisions in the English coinage,—

£	s.	d.		£	s.	d.		s.	d.		s.	d.	
2	0	0		1	0	0		10	0		5	0	
	13	4	(4 coins)		6	8	(4 coins)	3	4	(3 coins)	1	8	(3 coins)
	2	6			2			1				6	3*d*.
		10	(2 coins)			8	(2 coins)		4			2	(2 coins) 1*d*.

In all 18 sums, represented by 31 coins.

2 *b*. Only 2 sums are thus connected in the other system, each having its proper coin, viz., 3c. and 1c.

3 *a*. Sums connected by quinary division in the English coinage,—

£	s.	d.		£	s.	d.		s.	d.
2	0	0		1	0	0		10	0
	8	0	(3 coins)		4	0	(2 coins)	2	0
	5	0			2	6			
	1	0				6			

In all 10 sums, represented by 13 coins.

3 *b*. Sums connected by quinary division in the Metrical coinage,—

fr. *c.*	*fr.* *c.*	*fr.* *c.*
100	80	50
20	16 (3 coins)	10
4 (2 coins)	3·20 (3 coins)	2
·80 (3 coins)	0·64 (4 coins)	·40 (2 coins)
·16 (3 coins)		·08 (3 coins)

fr. *c.*	*fr.* *c.*	*fr.* *c.*	*c.*
40	25	2·50	·25
8 (3 coins)	5	·50	·05
1·60 (3 coins)	1	·10	·01
·32 (3 coins)	·20	·02	
	·04 (2 coins)		

In all 30 sums, represented by 52 coins.

The following summary shows the result of the comparison :—

	English Coinage.		Metrical Coinage.	
	Sums.	Coins.	Sums.	Coins.
Binary - -	22	32	21	25
Ternary - -	18	31	2	2
Quinary - -	10	13	30	52
	50	76	53	79

It appears that for binary division the metrical, or franc and centime system, has the advantage over the English, inasmuch as it expresses, in proportion, the same variety of halves, quarters, &c. by a smaller number of coins. In divisions by 3 the English coinage has a decided superiority in consequence of its duodecimal element; but this is compensated in favour of the franc and centime system by its having three times as many quinary divisions. On the whole the facilities for division are rather greater in using francs and centimes than in the English method.

38. I trust that I have already sufficiently answered these questions. Only one remark occurs. I am not sure that, next to 2, the number most frequently required as a divisor is 3. But I have admitted (Question 12,) that the weak point of the metrical system, and perhaps of all Decimal Systems, is that the number 3 does not especially suit it. Hence the use of it will be avoided, and this may be done without much inconvenience. In an immense multitude of cases, 3 will divide without a remainder under this system as well as any other. See Example in Question 12.

39. In this question, Lord Overstone asks : "can this system be justly considered as accidental or unscientific." I think it probable that by going back to the days of Charlemagne, we might discover traces of the origin of £ *s. d.*, or libræ, solidi, denarii, and find some evidence that 20 and 12 were adopted as divisors on account of their obvious convenience, and because experience showed their utility. Also the science of arithmetic was then cultivated even by Charlemagne himself. It was one of the seven liberal arts. No one could take the degree of M.A. without it. Boethius was as much studied then as Cocker and Walkinghame in our time. I think it probable, therefore, that the alleged considerations in favour of the division of the pound troy of silver into twenty equal pieces of silver, called soldi or sous, because they were used to pay the soldiers, and on similar occasions, and of the soldus into 12 deniers or denarii, were present to the thoughts of the financiers of that day. But I apprehend that the origin of the farthing was less scientific. The penny or denarius was actually cut into two, and each half was again cut into two, and these rude masses of copper were the halfpence and farthings of that day. This was no doubt accounted clever at the time, but can it come into competition with the franc and centime system, now so extensively substituted in its place?

42, 43. I have no objection to use the present coins, until they are either worn out or exchanged without loss, (which I think might be done) for the coins of the franc and centime system. But I think it undesirable to retain them longer than they are wanted.

Supposing our present coins to continue, the expression of them by pence only would be very bad, that being too low a unit. By far the best way is to have two denominations for all ordinary purposes, and two places of decimals, no vulgar fractions.

The pound sterling as a money of account, might be dismissed as perfectly useless; but the original pound might be restored, as it is now in France, the Kingdom of Sardinia, and other countries, where the franc and centime system prevails. Thinking a distinct name desirable for this splendid coin, which is equal in value to 100 francs, or exactly a pound, or half kilogramme of silver, I have proposed, in my communication to the Institute of Civil Engineers, to call it a Royal, (see the Scheme of Coinage, page 14). If we were to adopt the franc and centime system, this coin would be useful for forming stores of gold, as in banks, and for remittances to distant countries, whilst the money of account, corresponding to it, would be extremely convenient in expressing large sums of money. Thus the pound might be restored to its original value, and resume its ancient position with great advantage to all parties.

44. This is not the case with the franc and centime system. The franc is the unit of value. The "lowest money unit" is the centime. Amounts are often expressed in francs without any notice of centimes, either verbally or in writing (see example in the answers to Questions 8, 36, 37). The franc and centime system also requires an indication showing which figures denote francs, and which centimes, not a mere row of figures to be read off in one and the same denomination from beginning to end.

45. In reference to one of the questions, "omission of sums under a penny," I would observe that under the franc and centime system this convenience would be secured by omitting centimes. The modern degraded pound being discarded and the original pound restored, possibly under such a name as Royal, large accounts might be stated in royals and francs, although it is to be observed that the secondary units employed by the French in speaking of large sums are far higher. They speak of mille francs, millions, or milliards. I think the annexation of vulgar to decimal fractions

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though practised in Russia and Holland as well as the United States, is very awkward and inconvenient. This ought by all means to be avoided. The Americans, the Russians, and the Dutch were driven to it by adopting too high a unit.

46. This appears to me quite impracticable.

47. The vulgar fractions here referred to are obviously inconsistent with the uniform application of common arithmetic as explained in the answer to Question 9. The present Emperor, having called in the centimes and two-centime pieces with the cap of liberty, advertised for a new coinage by contract. The offer was taken by Messrs. Ralph Heaton and Sons, of Birmingham, in March 1855, who issued 31 tons of single centimes=31 millions of pieces, and the same weight of double centimes=15½ millions of pieces. But great quantities of the older coins remain in circulation. It is therefore quite a mistake to suppose that in France the sou, or five-centime piece, is the lowest coin in general use. Single centimes and two-centime pieces are used every day in transactions with the Government, as well as in shopping, marketing, and affairs of common life.

51. I think not, where the decimal computation is established.

52. I think it not only important but quite essential with respect to the principal monies of account. I would only observe, in reference to my answer to Question 45, that it may be matter for consideration, whether instead of denoting large sums as the French do by such terms as "milliards," "millions," and "millefrancs," it will be better to take a high secondary unit, such as the "royal," or piece of 100 francs. This would be analogous to the practice in regard to weights and measures. The kilogramme is become by practice almost as much a unit as the gramme, the hectare as the are. The litre is the unit for liquors, the hectolitre assumes the character of a unit for grain.

53. Yes.

"What inferences are to be drawn from these facts?" The inferences I draw are, that the division into mils is very inconvenient and difficult to work, and also that the dollar is too high a unit. The 1,000th part of a dollar is too small, and the 100th part too large for the lowest coin.

56. I have already expressed my opinion on these points (see Questions 42, 43, 45, 52), viz., that as respects high values it would have been far better if the pound had retained its original value, equivalent to 100 francs; that at its present value it is convenient as a coin equivalent to 25 francs, or nearly so, but of no use as a money of account; that the clear fractional divisions are as numerous under the franc and centime system as under our present system. I have also referred to the habit of the French of expressing large amounts by "mille francs," "millions," and "milliards," which practice, if found insufficient, they can alter with great facility, and without any abandonment of the principles of their system. Their method requires fewer figures and fewer words than ours.

With regard to the dollar and cent system, I concede to it the merit of priority. It was a first attempt at a decimal system of coinage. It was adapted to the existing practice of the United States, in which the Spanish dollar was the principal current coin. The statesmen and political economists of France undertook the same task some years later, not only with superior scientific acquirements, but with greater advantages from observation and experience, and adopted a system which, in my opinion, is in all respects far preferable to the dollar and cent system.

57. This question supposes the "Decimal System" to mean the "pound and mil" system, which I think would become the source of confusion, and retard the adoption of a better scheme.

63. The advantage of the Decimal System to those who keep extensive accounts will be a saving of time and labour, with a greatly diminished liability to error; but it will also be a great advantage to the lower classes by the greater simplicity of calculation, and the circulation of a small coin like a centime.

Lord Overstone's concluding questions have reference to the pound and mil scheme, and to the schemes founded upon the penny and the half-penny, to all of which I object as very imperfect and of small or doubtful advantage. If we are to introduce difficulties and temporary confusion, let us do it with a clear prospect of ultimate and important advantages.

I have written the preceding replies under an impression that it was my duty to answer his Lordship according to the best of my ability. If he expresses "great diffidence," how much more do modesty and caution become an humble inquirer like myself. I think the British public are under great obligations to his Lordship, and, so far as I have the means of judging, to his colleagues, for the great care and attention which they have bestowed upon this difficult and laborious inquiry; and, if their views are perhaps less comprehensive than might have been desired, I presume that this may be ascribed to the limited nature of their commission.

JAMES YATES.

Lauderdale House, Highgate.
June 17, 1857.

(*Communicated by Lord Monteagle.*)

DRAFT OF A BILL

For introducing, after a day to be named, a Decimal System of Accounts of Money, and for enabling Her Majesty to introduce a Decimal System of Coinage. 1857.

(Sketched by Sir WM. ROWAN HAMILTON, Royal Astronomer of Ireland.)

Sir W. R. Hamilton.

WHEREAS it has been found by the experience of many foreign countries that a Decimal System of Accounts and of Coinage is practicable and convenient; and whereas it has been expressed to be the opinion of many eminent commercial and scientific men, examined in several instances by commissioners appointed by the Crown, and otherwise having made known their views, that it will be advantageous and creditable to introduce such a Decimal System into these parts of the dominions of Her Majesty, on the basis of the pound preserved as the chief unit, but subdivided into one thousand parts or mils; and for other weighty reasons:

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and of the Commons, in this present Parliament assembled, and by the authority of the same,

I. That the present relations of legal value between the pound of account and the two gold coins and five principal silver coins which are now in use and circulation, namely, the sovereign, the half-sovereign, the crown, the half-crown, the florin, the shilling, and the half-shilling, commonly called sixpence, shall still continue to exist, and to be of full force in law; in such a manner that the coin called the sovereign shall still represent one pound in every contract or account, and shall still be legally exchangeable in the currency for two half-sovereigns, or for four crowns, or for eight half-crowns, or for ten florins, or for twenty shillings, or for forty half-shillings, of the kind called commonly sixpences.

II. But be it also enacted, That from and after the day of in the year of our Lord the existing values of all lower coins, whether silver or copper, shall be depreciated at the rate of four in the hundred, with relation to the above-mentioned gold and silver coins, without their relations to each other being disturbed, in such a manner that unless and until they or any of them shall be withdrawn from circulation the silver coin now called fourpence shall still be legally exchangeable for four copper pennies; the silver coin now called threepence shall still be exchangeable for three such pennies; the copper penny itself shall still be exchangeable for two copper halfpence; and the halfpenny shall continue to be exchangeable for two farthings, as at present: but that on and after the day already named the farthing shall cease to represent the nine hundred and sixtieth part of the pound, and shall be reduced to represent only the thousandth part thereof, in such a manner that the pound or the sovereign shall then and thenceforward be equivalent, in virtue of the present enactment, to one thousand farthings, the half-sovereign to five hundred farthings, the crown to two hundred and fifty farthings, the half-crown to one hundred and twenty-five farthings, the florin to one hundred farthings, the shilling to fifty farthings, and the half-shilling, now commonly called sixpence, to twenty-five farthings, or to six pennies of the new value, and to one farthing over.

III. And be it further enacted, That from and after the day already named whenever any sum of money shall be found to have been expressed or stated in any contract or account under the now existing form of pounds, shillings, and pence, if such contract or account shall bear any date precedent to the said day, it shall be lawful, and all courts of justice are hereby required, to interpret and construe the shillings as still representing each the twentieth part of a pound; but to consider and treat every penny which shall remain over and above, after the pounds and shillings have been deducted, as equivalent only to four of the new or reduced farthings, and therefore as representing only the two hundred and fiftieth part of a pound, and not as now the two hundred and fortieth part thereof.

[*Note.* As an example of the proposed working of this Section (III.) suppose that A. owes B. at present, or will owe him before the day when the Act comes into operation, 50*l.* 11*s.* 7*d.*, as expressed in our present, and till then existing, currency.

It is intended that A. should be permitted to discharge his debt when the new system comes into operation by paying to B.,—1st, fifty sovereigns in gold, or whatever is now a legal equivalent, such as ten notes of the Bank of England for 5*l.* each, or one note of that Bank for 50*l.*; 2d, eleven of our present silver shillings, or whatever (going no lower than the half-shilling) is now their legal equivalent, as for instance, five florins and one shilling, or three florins, four shillings, and two half-shillings; or one crown, two half-crowns, and two half-shillings, &c., and 3d, seven of

Sir W. R. Hamilton.

our present copper pennies, notwithstanding the slight proposed depreciation of their value, in virtue of which depreciation, it is designed to make it legal to tender one half shilling in silver and three copper farthings, as an equivalent for the sum of seven-pence, recorded in the contract or account.

In this manner no debtor A. will save, nor will any creditor B. lose, quite so much as a single halfpenny on any one transaction, however large, and, while all trouble of calculation will be avoided, nothing that can be called injustice will be done.]

IV. (Turnpike Trusts.)

V. (Parliamentary Trains.)

VI. (Postage Stamps.)

VII. And be it enacted, That from and after the day already named it shall not be lawful to draw up or to execute any contract, or to furnish any statement of account, respecting any transaction on or subsequent to the said day, wherein the present form of reckoning by pounds, shillings, and pence shall be retained; but that it shall be necessary, for the purpose of giving legal validity to any such future contract or account, that all monies mentioned therein shall be reckoned, expressed, and stated in the form of pounds, florins, and farthings, or in some equivalent decimal form, with one intermediate coin of account, such as subsequent clauses of this Act may allow.

VIII. And be it enacted, That it shall be lawful for Her Majesty to issue a new silver coinage, each coin to be stamped and called a cent, and to represent the hundredth part of a pound, or ten farthings of the new value; but that, whether such a new silver coin shall or shall not be issued by Her Majesty, it shall be lawful, on and after the day already named, to reckon and describe any sum of money as consisting of pounds, florins, cents, and farthings, instead of pounds, florins, and farthings only, the word cent being construed as equivalent to ten farthings, or to the hundredth part of a pound; in such a manner that a shilling may be described either as fifty farthings, or else at pleasure as five cents; and that a half shilling may be expressed and written in the new system of accounts, either as twenty-five farthings, or as two cents and five farthings.

IX. And be it enacted, That it shall be lawful for Her Majesty to issue a new copper coinage, each coin to be called a half cent, and to be equivalent to five farthings, or to the two-hundredth part of a pound; but that such coins, if issued, shall be only coins of circulation, and shall not be coins of account; in such a manner that the name half-cent shall not be used in any legal contract or account, nor any abridged symbol to denote it.

X. And be it enacted, That, whether such half-cents or five-farthing pieces shall or shall not be issued, it shall still be lawful for Her Majesty to issue a copper coinage, each coin to be stamped and called a mil, and to represent the same value as the reduced farthing, namely, the thousandth part of the pound; but that, whether such a new copper coin shall be issued or not, it shall be lawful, on and after the day already named, for any person who may prefer it, to use the word or name mil instead of the name farthing in describing any sum of money, in such a manner that a half-shilling may then be described and reckoned, in any account, either as twenty-five farthings, or as two cents and five farthings, or else at pleasure as twenty-five mils, or as two cents and five mils; and that no such description of any sum of money by pounds, florins, cents, and mils, instead of pounds, florins, and farthings, shall be held to invalidate any contract or account.

XI. And be it enacted, That this Act may be amended or repealed by any Act which shall be passed during the present Session of Parliament.

VIVAT REGINA.

[Sketched, May 12th, 1857. Copied for Lord Monteagle's inspection, June 22d, 1857. Observatory of T. C. D.—W. R. Hamilton. It is scarcely necessary to say that I have not had the advantage of any legal (or indeed of any) assistance in sketching the present Draft of a Bill; and that I have merely tried to put into some sort of working shape the views which reading and reflection have suggested to myself, and of which, perhaps, not one is new, on the subject of the Decimal Coinage.—W. R. H.]

J. Page, Esq.

(*Communicated by Lord Overstone.*)

FOREIGN EXCHANGE.

By JULIUS PAGE, Esq.

In considering the alterations of the divisions of the pound sterling as proposed by the new Decimal System, an important point is the effect it may produce in the mode of expressing the variations in price of many articles. Cotton, tea, and tobacco, spices, drugs, and chemicals, are now quoted even by the wholesale traders in pence per pound weight, and the changes in price are made by $\frac{1}{4}$, $\frac{1}{8}$, and even by $\frac{1}{16}$ of a penny. The first change from the old to the new system, were it ever to take place, might be a matter of small importance, but the subsequent variations of the market would probably produce more difficulties than are at present anticipated.

Thus if cotton, under the old system, is quoted $7\frac{5}{16}d.$ per pound, this is strictly equal to 0·033072916′*l.* in decimals of the pound sterling. This there is no inconvenience in calling ·033 (that is, thirty-three mils per pound). But a rise in price of $\frac{1}{16}d.$ according to the present mode is represented by ·000260416′ in the proposed notation, that is, it is about a quarter of a mil, and therefore, in order to quote to as fine a difference as at present, we must either have recourse to a vulgar fraction of our lowest decimal denomination, thus mixing two systems, or we must call this increase ·00025, whereby we add two figures more to our already long array, and our quotations would progress in one of the following series :—

·033$\frac{1}{4}$	or	·03325
·033$\frac{1}{2}$	,,	·0335
·033$\frac{3}{4}$	,,	·03375
&c.		&c.

The first would probably be the mode adopted, the divisions by $\frac{1}{4}$, $\frac{1}{2}$, &c. being the most natural to the generality of persons; and of this we have an example in the United States, for, although their coinage recognizes the one tenth part of a cent (which is their mille) yet it is never used, and the quotations of cotton and other goods sold wholesale at a price per pound are expressed in cents and sixteenths of cents; thus :—

Cotton $11\frac{3}{16}$, $11\frac{1}{4}$ or $11\frac{3}{16}$, $11\frac{7}{8}$, &c.

There is also another species of quotation in which the difficulties arising from the change will perhaps be greater than in the prices of goods. I refer to the foreign bill market, the operations in which are very large. Among the thirty or thirty-one places in foreign countries usually quoted in the printed courses of exchange there are some where the exchanges are expressed in a variable amount of foreign money for the constant quantity of 1*l.* sterling, others in which the quotation is by a variable number of pence sterling for an integer of the foreign coin; and there is also a further difference according to whether the foreign place quotes on London in the same or a different manner to that which we adopt here. The following is a table of all these variations :—

The variable in London expressed in foreign money.

2	places in	Holland,	f. 11·18$\frac{1}{4}$ per 1*l.* sterl.
1	,,	Belgium,	f. 25·42$\frac{1}{2}$,,
1	,,	Hamburg,	M. 13· 6$\frac{7}{8}$,,
3	,,	France,	f. 25·67$\frac{1}{2}$,,
1	,,	Berlin,	D. 6·24$\frac{1}{2}$,,
2	,,	Austria,	fl. 10·33 ,,
1	,,	Leghorn,	lre. 29·47$\frac{1}{2}$,,
1	,,	Milan,	
1	,,	Genoa,	lre. 25·75 ,,
1	,,	Francfort,	fl. 119$\frac{1}{4}$ per 10*l.* do.
14			

All these places quote on London in the same manner as London on them.

The variable in London expressed in pence sterling.

1	place in	Russia,	$37\frac{3}{8}d.$ for 1 rouble.
6	,,	Spain,	$49\frac{7}{8}d.$,, 1 dollar.
2	,,	Portugal,	$52\frac{3}{8}d.$,, 1 milrea.
1	,,	Rio,	$24\frac{1}{2}d.$,, ,,
1	,,	Bahia,	$24\frac{1}{2}d.$,, ,,
11			

These places also quote on London in the same manner as London quotes on them.

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The following six places quote on London in a different manner to our quotations on them.

Quotations here.					*Quotations abroad.*
1 Venice	47 pence	for	6	Aust. lire.	30 lire 15 c. for 1*l.* sterling.
1 Naples	$42\frac{3}{8}$ „		1	„ ducat.	552 grani „
1 Palermo, 1 Messina	$129\frac{1}{4}$ „		1	„ onza.	61 tari „
1 New York, 1 Philadelphia	$47\frac{3}{4}$ „		1	dollar.	$109\frac{1}{2}$ per cent. on a nominal par of 4*s.* 6*d.* sterling per dollar.
6					

As in the first list of fourteen places the variation is made, both here and abroad, in the amount of foreign coin per pound sterling, no alteration will take place in the quotations by a change in our denominations. But fixing the exchange at which a bill is bought or sold is only the preliminary step, and the amount is then to be cast out either from foreign into English or from English into foreign money. In this part of the inquiry it appears to be the fashion among the admirers of a decimal notation to select all their examples from the Paris Exchange, and as that place possesses already a decimal coinage their choice is not a bad one. But Paris is not the only continental city with which London deals extensively in exchange operations, and if examples were taken of these calculations on—

Berlin, where the dollar is divided into 30 groschen,
Vienna „ florin „ 60 kreutzers,
Hamburg „ mark banco „ 16 schillings (each of 12 pfennings),

there might, perhaps, be found a difference in the comparative facility of calculating by the old and new English denominations not always in favour of the latter.

Take Hamburg as an example: the mark is divided into 16 schillings, and each of these into 12 pfennings; therefore 1 mark = 16 schillings = 192 pfennings, which is capable of division without fractional remainders by almost all the factors of our 240 pence (except 5 and its multiples). This is a great advantage in this description of calculation as assisting in taking aliquot parts. Although the writer of these remarks uses decimals wherever he finds them most convenient, yet in cases similar to the above he recollects an old rule taught him at school called Practice, which is often of great utility in saving time and figures. Let the admirers of decimal arithmetic try to reduce 847*l.* 7*s.* 6*d.* sterling into marks and schillings banco at the exchange of 13 marks $6\frac{7}{8}$ schillings per pound sterling by the usual and the decimal methods, and report the result with reference to time and number of figures. The shillings and pence in the above sum have been selected that they may have an exact equivalent in decimal notation, viz. 847·375*l.*, but they may as well also try such sums as 847*l.* 7*s.* 11*d.* (whose nearest equivalent is 847·396*l.*); and they will perhaps find no great improvement by the change.

The division of the mark into 16 schillings, being the same as the number of ounces in the Hamburg pound weight is found to be so convenient both in wholesale and retail business that it would be absurd to expect that the traders in Hamburg would alter their coinage to a decimal division to assist us in a difficulty in exchange business which we propose bringing on ourselves.

The investigation of the exchanges on Berlin, Vienna, Francfort, and other German places, will give nearly the same results, viz., that the division of 30 and 60 parts to the integer offers greater facilities for calculating with our present denominations than with the proposed decimal divisions of the pound sterling.

The second list of eleven places where the variations in the exchange take place in pence and parts of pence sterling presents a different set of difficulties. The usual alteration in the quotations per rouble or per dollar are made in $\frac{1}{8}$ths of one penny, but sometimes the fluctuations only increase or diminish by $\frac{1}{16}$th of a penny; thus the quotation of bills on St. Petersburg is $37\frac{3}{8}$ pence per rouble, which is equal, according to the decimal scale, to 0·15572916′, which may be called ·155$\frac{3}{4}$, or ·15575, and the $\frac{1}{16}$th of the penny being, as before observed, about $\frac{1}{4}$th of a mill, the quotations would probably range thus :—

Present Quotation.	Correct Decimal.	Probable future Quotation.
$37\frac{1}{4}$	·1552083′	·155$\frac{1}{4}$ or ·15525
$37\frac{5}{16}$	·15546876′	·155$\frac{1}{2}$ „ ·1555
$37\frac{3}{8}$	·155729916′	·155$\frac{3}{4}$ „ ·15575
&c.		

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the quotation varying either by half of one mil (representing nearly $\frac{1}{8}$th of a penny), or by $\frac{1}{4}$th of 1 mil (representing nearly $\frac{1}{16}$th of a penny).

But the above disposes of the alteration only so far as it is under the control of the London market, and it remains to be considered how far it is probable that the foreign merchants will alter their mode of quoting to accommodate us. A very considerable time must elapse before this can be accomplished, if it ever is done, as nothing appears more difficult of alteration than an old accustomed exchange quotation. It is not many years back when the ordinary mode of quoting bills between Francfort and Paris included the old Livre Tournois as one of the steps of the comparison, a coin which had been superseded at the beginning of the first French Revolution in the last century, and a clumsy proportion of 81 to 80 was comprised in every calculation in order to reduce the livres into francs. A merchant abroad might say that as he means by a penny the $\frac{1}{240}$th part of a pound sterling, and that this pound is not altered in value he may continue quoting $37\frac{3}{8}$ of these pence, or 240ths as the equivalent of one integer in his own coin, by which means a further complication will be added to a subject already sufficiently intricate.

It may be said that we might alter our mode of quoting these eleven places into the same method as we use for the fourteen already mentioned, and instead of stating that one Russian rouble is worth $37\frac{1}{4}d.$, we might say that ro. 6.44 (that is, 6 roubles and 44 copecks,) is the equivalent of 1*l.* sterling, and the same with Spain and other countries. But here the same doubt arises, whether it is probable that other nations will also vary their quotations to accommodate them to our wishes; otherwise the matter will be in a worse state of confusion than if we altered to the decimal parts of the pound, because we should be using a totally different principle instead of a different division.

That the doubt here expressed of the willingness of other nations to conform to our new quotations is not a groundless fear may be shown by the third table in page 2, consisting of six places where the method of quoting has always been different in the two countries, and, notwithstanding the inconvenience occasioned by this mode, appears incapable of alteration. The error of this system may be easily shown. If the quotation in London on Paris for bills at three months' date is $25{\cdot}57\frac{1}{2}$, and at the same time at Paris on London it is 24·80, any excess in the difference of these amounts beyond the actual difference of interest will show directly in which place the exchange is the highest. The same thing occurs in comparing the exchange at London and Lisbon, where both are expressed in pence sterling; but take the exchange at London on Naples $42\frac{3}{8}$ pence for 1 ducat, and the exchange at Naples on London 552 grani per 1*l.* sterling, and here it will be immediately seen that we must first reduce one of these quotations to an equivalent according to the other method before any comparison can be made between the two, that is, we must work out one of the following proportions:—

If $42\frac{3}{8}d.$ gives 1 ducat, what will 240 pence give?

Or,

If 5·52 ducats gives 240 pence, what will 1 ducat give?

Should the decimal division of the pound sterling ever come into operation it will be therefore preferable in the cases of Venice, Naples, and Sicily to adopt the mode of quotation used by these respective countries. With regard to the New York exchange the American mode of quoting is so absurd that an alteration even to the decimal scale would be preferable to the one they have adopted. An exchange of \$4·87, \$4·88, &c., per 1*l.* sterling is, however, the most natural. It was tried in the United States some years ago, but never came into general use; for what reason must be left to them to explain.

All the preceding remarks refer exclusively to the probable effect of the Decimal System on the operations of direct exchanges, that is, on the quoting and calculation of foreign bills drawn or negociated in this country; but a very extensive trade in bills is also carried on where the operation is of a more complicated character. Thus a dealer in bills constantly requires to ascertain whether a bill drawn on one foreign place will make a good remittance if sent to some other city. As an example:—If bills on Lisbon are quoted here at 54 pence per milrea (that is, 1,000 reis), and the last course of exchange received from Amsterdam states that they could be sold there at 46 Dutch florins per 40 crusadoes of 400 reis each (that is, 16,000 reis), it is required whether the purchase and transmission of these Lisbon bills to Amsterdam will yield a profit? The process by which this is ascertained is called an exchange arbitration, and the method of stating and working it is called the chain rule, which, for this case, is as follows:—

		240 pence sterling:
54 pence	=	1,000 reis,
16,000 reis	=	46 florins.

After cancelling those figures which are common to both sides, the resulting calculation consists in multiplying 46 (the Amsterdam quotation) by 15, and dividing the product by 54 (the London quotation), the quotient is florins $12{\cdot}15\frac{5}{8}$ nearly per 1*l.* sterling, and this is then compared with the direct course between London and Amsterdam to ascertain the profit or loss on the operation.

The quotations used above are intentionally made in whole numbers for the sake of simplicity, but fractional sums are much more common, as $54\frac{5}{8}$ and $46\frac{3}{4}$, which of course give a much greater amount of labour in the calculation.

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In a card of exchange arbitrations, which is required to be made out fresh every post day, I usually employ about forty results of calculations similar in theory to the one just described, some being rather easier and others more tedious in calculation than the above examples, but having been many years engaged in these calculations I have put down the results of about thirty thousand of them, which are arranged in tables; there are many persons, however, who possess a much larger stock of them.

The following is a small piece copied from the centre of the one used for Lisbon bills at Amsterdam, in which each small square represents the result of one of these calculations. Thus when the two quotations are $54\frac{1}{4}$ and $44\frac{1}{2}$, the answer is immediately seen to be $12{\cdot}6\frac{1}{8}$, without the trouble of a fresh computation.

Lisbon at Amsterdam.

London Quotations.	Amsterdam Quotations.				
	44	$44\frac{1}{4}$	$44\frac{1}{2}$	$44\frac{3}{4}$	45
54	$12{\cdot}4\frac{1}{2}$	$12{\cdot}5\frac{7}{8}$	$12{\cdot}7\frac{1}{4}$	$12{\cdot}8\frac{5}{8}$	12·10
$54\frac{1}{4}$	$3\frac{3}{8}$	$4\frac{3}{4}$	$6\frac{1}{8}$	$7\frac{1}{2}$	$8\frac{7}{8}$
$54\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{5}{8}$	5	$6\frac{3}{8}$	$7\frac{3}{4}$
$54\frac{3}{4}$	$1\frac{1}{8}$	$2\frac{1}{2}$	$3\frac{7}{8}$	$5\frac{1}{4}$	$6\frac{5}{8}$
55	0	$1\frac{3}{8}$	$2\frac{3}{4}$	$4\frac{1}{8}$	$5\frac{1}{2}$

Now what will be the result of abolishing the pence in our currency?

54 pence = ·225 of a pound in decimals; but
$54\frac{1}{8}$ = ·22552083′
$54\frac{1}{4}$ = ·22604166′
$54\frac{3}{8}$ = ·2265625
$54\frac{1}{2}$ = ·227083′
&c.

The new quotations will evidently vary by $\frac{1}{2}$ of a mil, as ·225, ·225$\frac{1}{2}$, ·226, &c., but as none of them will correspond exactly with the $\frac{1}{8}$th and $\frac{1}{4}$th, &c. of the former calculations, this table will become totally useless, as well as all those in which our quotations are made in pence.

In this sense, therefore, the old exchange calculator will be on a par with the new cambist who begins computing for the first time; that is, they will both be compelled to cast out every arbitration afresh, whereas the older one has now most of them ready done to his hand. But this in itself can be of no benefit to the new one, though most injurious to the other.

Let us now ascertain whether there will be any saving of time in the actual calculation by the new method. Our new quotations will be ·225 or ·225$\frac{1}{2}$, &c. per milrea. The Dutch quotation will of course remain as before $45\frac{3}{4}$, or 46 florins for 16,000 reis, and the stating of the arbitration will be—

£1 sterling:
·225 = 1,000 reis.
16,000 = 46 florins.

After dividing both sides by their common measure, 1,000, the working will be ·225 multiplied by 16, and the product used as a divisor to the remaining term on the other side, that is, 46, and the result will be as before florins $12{\cdot}15\frac{5}{8}$ nearly, and subject, as in the previous case, to the probability of fractions on both sides, as ·226$\frac{1}{2}$ and $45\frac{7}{8}$.

A comparison of the working of this equation by the old and new methods will show very little difference in the number of figures employed, and this difference rather in favour of the old method.

But London is not the only foreign bill market, and in many of the principal cities of Europe a large business is carried on in exchanges. The merchants there have also their arbitrations and calculations to perform, and these will be as much deranged by an alteration of the denominations of the pound sterling as our own. Taking the example of Lisbon bills bought by a trader in Hamburg, should he wish to ascertain if they will be a good remittance to London he must use our quotation for Lisbon bills, and would at present work with a formula containing our price of, say, 54 pence per milrea; but if we alter our mode of quoting to ·225, his former calculations become useless, and he, as well as ourselves, must begin again, so that the prospect of trouble and inconvenience is largely increased the more it is considered.

From what precedes it is not intended to be inferred that in exchange calculations the present modes are in all cases shorter or easier than they would be by decimal denominations of the pound sterling. Under many circumstances decimals are now largely used for this purpose, and by taking some sterling amounts terminating with 17*s.* 5*d.* or 19*s.* 11*d.* (which are rather refractory when treated by Practice), the corresponding

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equivalents in the decimal coinage may in some cases be shown to require absolutely fewer figures than the usual methods, but as a general rule the present notation gives greater facilities in most cases, and especially when the German places are in question.

To bankers and book-keepers, whose principal occupation is only with the two first rules of arithmetic, that is, the addition of long columns of figures and an occasional subtraction, there is an evident advantage in a decimal system. To these gentlemen each amount is a mere abstract quantity of figures, which they have to mass together into totals in the easiest manner they can contrive; but to the parties who pay or draw these checks and bills these sums are each the representative of the final result of perhaps long calculations. The first on the list may be the net proceeds of a parcel of cotton sold at $9\frac{13}{16}d.$ per pound, the next the equivalent of a bill on Hamburg negociated at $13{\cdot}5\frac{3}{8}$, and the same of the rest, and as many of these calculations (not mere additions) are probably executed with much greater facility by the old than by the proposed new method, the question must naturally arise whether it is discreet to impose these fresh difficulties on real calculations in order to facilitate in a very small degree the mere addition and subtraction of their final results.

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FINAL REPORT

OF THE

DECIMAL COINAGE COMMISSIONERS.

Presented to both Houses of Parliament by Command of Her Majesty.

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EXPLANATION OF THE REFERENCES.

I. or App. I.	refers to	The Preliminary Report of the Decimal Coinage Commission, with the Appendix, 1857.
II. or App. II.	„	The separate Appendix to the Final Report of the Decimal Coinage Commission.
Ans. or Answers	„	Questions communicated by Lord Overstone to the Decimal Coinage Commissioners, with Answers, 1857.

REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, Your Majesty's Commissioners for considering how far it may be practicable and advisable to introduce the principle of Decimal division into the Coinage of the United Kingdom, humbly offer to Your Majesty this our final Report.

At an advanced stage of the inquiry, when the taking of evidence had been closed, and the deliberations preparatory to a final Report had commenced, we received an official communication from our Chairman Lord Monteagle, informing us that he had placed the resignation of his appointment in the hands of the Chancellor of the Exchequer. Of the loss which the Commission has thus sustained, we, the remaining Commissioners, are deeply sensible. Nevertheless, adverting to the terms of Your Majesty's Commission, which authorize and require any two of the Commissioners to inquire and report in writing their opinions touching and concerning the subject matter of Your Majesty's Commission, we have felt it incumbent upon us to proceed to fulfil Your Majesty's gracious command.

The conclusions at which we have jointly arrived are embodied in the following Resolutions:—

1. That the circumstances under which decimal coinage has been introduced in foreign countries, although affording both instruction and warning to us, differ in many important respects from those which exist in this country, and, therefore no safe conclusions for our guidance can be drawn from the examples, more or less satisfactory, of other countries.
2. That there appears to be no approach to unanimity of opinion, on the question of the introduction of decimal coinage, in the commercial or other classes of the community.
3. That it is very difficult to come to any useful conclusion as to the merits of the decimal principle in the abstract.

   Distinct and peculiar difficulties attend each separate form in which it has been proposed to introduce the decimal principle into the coinage of the country. A decimal coinage founded on the penny necessarily ejects the pound sterling, whilst a decimal coinage founded on the pound must involve all the inconveniences attending the abandonment of the penny.
4. That although many important advantages would attend a decimal coinage founded on the penny, as compared with the pound and mil scheme, yet that a coinage which necessarily involves the disturbance of the pound sterling would, in the present state of public feeling, be unadvisable, and, in fact, impracticable.
5. That the pound and mil scheme is the only form in which, under the present state of public feeling in this country on the question, the introduction of the decimal principle into our coinage can be contemplated with any reasonable probability of sufficient support.
6. That as regards paper calculations there appears to be a preponderance of advantage on the side of decimal coinage; but the extent of the superiority in that respect may be the subject of much difference of opinion.
7. That as regards the comparative convenience of our present coinage and of the pound and mil scheme, for the reckonings of the shop and the market, and for mental calculations generally, the superiority rests with the present system, in consequence, principally, of the more convenient divisibility of 4, 12, and 20, as compared with 10, and the facility for a successive division by 2, that is, for repeated halving, in correspondence with the natural and necessary tendency to this mode of subdividing all material things, and with the prevalence of binary steps in the division of our weights and measures.
8. That as regards the comparative convenience of the coins provided by the rival systems, the advantage appears to rest with our present coinage.
9. That the particular form of decimal coinage proposed as the pound and mil scheme cannot be looked upon as a well-assured or demonstrated improvement on our present coinage; but must rather be considered as an experiment of very doubtful result, accompanied, beyond all question, by many serious transitional difficulties.

The duty now devolves upon us to sum up the evidence before us, and to state the opinions we have formed, and the course we are prepared to recommend with reference to the question submitted to us.

Before discussing in detail the arguments in favour of, and in opposition to, the introduction of the Decimal principle, it will be convenient to consider how far the question is concluded or affected by the experience of foreign countries in which a decimal coinage has been established, and to what extent the change is desired or deprecated by different classes among ourselves.

Experience of Foreign Countries.

II. The questions drawn up with a view to ascertain the result of the experience of foreign countries were directed mainly to the following points.—1. The form of decimal coinage in use; 2. The character of the coinage which it supplanted; 3. The motive and occasion of the change; 4. The manner of effecting the transition, and the extent to which it had been practically carried out; 5. The relative convenience of the old and new systems;—to which were added inquiries, whether the decimal coinage had been preceded, accompanied, or followed by a decimal system of weights and measures, and whether any inconvenience had been felt where this was not the case.

By the courtesy of the Governments to whom our questions were communicated, and by the exertions of Your Majesty's Ministers in foreign parts, we have been placed in possession of ample information on all the subjects of our inquiries.

The Reports which have been received from foreign countries where the Decimal principle has been introduced concur generally in the statement that the system has been found to work satisfactorily, and to be an improvement on their previously existing forms of coinage.

But there are some circumstances which render this concurrent testimony to the convenience of a decimal coinage less applicable to our own case than it would at first sight appear. In many countries, a decimal coinage is accompanied by a decimal system of weights and measures; in other countries, the decimal principle is used only for accounts, while neither the coins in actual use nor the general metrical system are decimal. Such examples are far from conclusive in favour of the proposal to combine decimal coins with a non-decimal system of weights and measures. Those who most strenuously advocate the introduction of decimal subdivision into our coinage, freely admit that much of the anticipated advantage would be lost unless weights and measures were also decimalized; and it is obvious that the convenience of the complete decimal system established in France and other countries affords no indication of the measure of success which would attend the more limited change which we are considering. So far, however, as this observation is concerned, Russia and America are examples in point for us.

There is another very material circumstance which diminishes the importance of the opinions given by foreigners in favour of their existing systems of coinage. When dwelling on the superior convenience of a decimal coinage, their comparisons are, of necessity, made with the systems which have been supplanted by it. Now the previous state of the coinage in every country in which a change has been effected appears to have been one of extreme confusion and inconvenience; and an impartial comparison between different systems has been rendered still more difficult by the fact that the change to decimals was, in many instances, made for the sake of conformity to the habits of contiguous states, and was sometimes a mere recognition by law of a coinage which had already forced itself into partial circulation.

Another distinction, which it is essential to bear in mind, in order rightly to estimate the weight of the experience of other countries, is this,—that, without any exception, the various decimal coinages established in different parts of the world have their maximum unit much smaller than the pound sterling, and comprise only 100 steps between the highest and the lowest units in actual use. This universal preference for a centesimal over a millesimal division would not, indeed, militate against some of the schemes which have been suggested to us; and it has, in fact, been urged as one of several grounds in favour of the conclusion, that a system of coins proceeding from 1*d.* to 100*d.*, or from ½*d.* to 50*d.*, would be superior to any other form of decimal coinage, and particularly to the pound and mil scheme.

Rival Schemes.

III. The discussion of the question under our consideration will be much facilitated by fixing the mind on some one specific system of decimal coins with which to compare

the coinage now in use among us. The considerations bearing upon the question are so different with respect to different forms of decimal coinage, that it is very difficult to come to any useful conclusion as to the merits of the Decimal principle in the abstract, What we have to determine to the best of our ability is, whether any one of the specific schemes proposed would be an improvement on the present coinage. It will greatly simplify this inquiry if any sufficient grounds can be found for limiting the investigation to some one or more particular projects, and we will therefore so far anticipate the general discussion as to consider which of the rival schemes seem to be best entitled to a detailed examination.

It is one of the difficulties peculiar to our own case, that the pound, which serves as the unit in large transactions, and the penny, which is the basis of all retail dealings, cannot both be retained in any system of decimal coinage. Both are, however, so fixed in the habits and associations of the people, and in the fiscal and monetary system of the country, that neither can be given up without serious inconvenience. All the schemes to which our attention has been called range themselves under one of these two heads,—those which, abandoning the penny, retain the pound, or some nearly-related coin, as one of the coins of account; and those which take as the minimum the penny, or some other coin closely related to it, and therefore necessarily involve the abandonment of, or some change in, the pound. The pound and mil scheme, and the penny scheme, may be taken as typical of the two classes; and a comparison between them will serve to determine the direction which our investigation ought to take.

Penny Scheme.

The following is a brief summary of the arguments which have been urged by the advocates of a penny unit:—

1. Every decimal system consists merely in choosing some coin as the minimum unit, and expressing all other sums by writing down in our common arithmetical notation the number of such coins which they contain. It is therefore a simpler and more natural method to take an existing coin as such minimum unit, than to select a new value like the mil, which does not lead to any coin of account at present existing, until we arrive at a denomination as high as the pound sterling.

2. The retention of the pound necessarily involves the use of 1,000 steps between the highest and the lowest units, while the penny would give us a scale with only 100 steps, terminating in a coin which would be nearly equivalent to two American dollars.

3. The penny system would allow all sums expressed in the present coinage to be exactly converted into their decimal equivalents by simply reducing them to pence; while the pound and mil system would render an exact conversion generally impossible, and even an approximate one more or less complicated. In other words, the penny system would interfere with accounts based on the pound, much less than the pound and mil system would interfere with reckonings based on the penny.

4. The disturbance of existing habits, by the introduction of the penny scheme, would not only be less violent, but would fall upon the affluent and educated classes, who could easily learn to accommodate themselves to a new mode of reckoning; while the pound and mil coinage would utterly derange the habits and the arithmetic of the lower classes, who would feel much greater difficulty in adapting themselves to a novel system.

5. The abandonment of the pound as a coin of account would not necessitate the change of any payment fixed by law or custom; while the surrender of the penny would require a new adjustment of the postage, the customs, and the excise, and of all penny stamps on bills of exchange, bankers' drafts, and receipts, a new scale of pay for the army and navy, and a modification of almost every tariff of tolls in the country. It would derange many branches of industry which have settled down on the basis of prices expressed in pence, which would have no equivalents in a coinage made up of mils. The whole commercial world would, moreover, be disturbed by the loss of the penny, which is now the universal minimum in the accounts of bankers and others, and the basis of exchange with many foreign countries.

It is impossible to deny that these arguments have much force. The essence of the complaint urged against the present coinage is, that it marches by steps which do not correspond with those of our numeral system. There are 12 pence instead of 10 to the shilling, and 20 shillings instead of 10 to the pound. A sum written down in this notation does not declare to the eye the number of each class of coins which it contains, as it would do if the progression were by tens; and the common rules of arithmetic have to be complicated by what is called compound arithmetic, in consequence of the use of the numbers 12 and 20 in place of 10. If a shilling were equal to 10 pence, and a pound to 10 shillings, a sum stated in £. *s.* *d.*—as, for example, 1*l.* 2*s.* 3*d.*—would declare itself equal to 123*d.*, or to 12*s.* 3*d.*, without any process of reduction, and could

be handled in the same way as the mere number 123*d.* in all the calculations which might have to be performed upon it. But on the present system the number of pence in 1*l.* 2*s.* 3*d.* is only ascertained to be 267 by a series of multiplications, and every calculation with such a broken sum must be worked by the cumbrous rules of compound arithmetic, instead of by the easy methods of simple arithmetic.

The obvious way of curing a defect which consists in the fact that twelve pence are counted to the shilling in place of ten, is to substitute the latter for the former number, and use a tenpenny instead of a twelvepenny shilling. The inconvenient rule that 20 shillings make a pound would be naturally got rid of in the same way, by employing ten of our tenpenny shillings to make up the next coin of account. This would be the penny scheme. But to reach the pound and mil coinage, we have not only to change the obnoxious twelves and twenties into tens, but to adopt an entirely new unit—the mil—in which no sum expressed in our present coinage, except sixpence and its multiples, can be exactly paid, as the basis of the progression. Thus we have a double revolution, which is not only theoretically a more violent change, but would be attended in practice with much greater transitional difficulties.

It has indeed been said that the pound and mil scheme involves no larger change than the penny system, and only differs from it in beginning at the upper, in lieu of the lower end of the scale. This appears to be a fallacy, both for the reason above referred to, the incommensurability of the mil and the penny, and also because the mind inevitably starts from the lower unit. We state our money table now as :—

	12 pence	= 1 shilling.
	20 shillings	= 1 pound.

Not as—

	1 shilling	= $\frac{1}{20}$ of a pound.
	1 penny	= $\frac{1}{12}$ of a shilling.

In the same way we should be compelled to treat the pound and mil progression by saying—

	10 mils	= 1 cent.
	10 cents	= 1 florin.
	10 florins	= 1 pound.

Its introduction would thus involve both a change in the law of progression, and a change in the fundamental unit. The transition would therefore be less easy and natural than that to the penny coinage, and would involve much greater disturbance of existing arrangements.

Pound and Mil Scheme.

Notwithstanding these recommendations of the penny scheme, it is open to an objection which has been pronounced by many high authorities to be absolutely fatal. The pound is the great unit by which all large values are estimated in this country—our notions of property, and of the charges upon it, are formed in pounds—it is the basis of our national and commercial accounts, and the instrument of our most important calculations. The mischief caused by a dislocation of deeply-rooted habits of business and of thought would, moreover, be greatly aggravated by any general hostility to the change ; and, in point of fact, the hold which the pound sterling has obtained upon the associations and habits of the mercantile world appears to be so strong, and the preponderance of opinion among the advocates of decimals is so decidedly in favour of the pound and mil scheme, as to render this the only form of decimal coinage which could be introduced in this country at the present time, with the smallest chance of practical success. The attempt to establish a decimal coinage founded on the penny, would probably be opposed as energetically by the supporters of the pound and mil scheme as by the admirers of the existing system ; for we have found that almost all who have recommended the introduction of Decimal Coinage in any shape have appeared more willing to acquiesce in the continuance of the present system than in the selection of any rival modification of the Decimal principle. No change in the coinage would, in our opinion, be justified without the prospect of a preponderating amount of support ; and certainly the suppression of the pound is a step which could not be thought of, unless it were acquiesced in by a considerable proportion of the commercial classes. Now, although the penny or some analagous system has been very ably advocated by Dr. Gray, Mr. Yates, Mr. Hincks, and others, its supporters form a small minority ; and we have found it impossible to avoid the conclusion that none of the schemes which would disturb the pound command such a measure of general favour even among the advocates of the Decimal principle as to render the introduction of them practically possible.

It is therefore upon the particular form of Decimal Coinage known as the pound and mil scheme that we feel ourselves called upon to adjudicate ; and our observations will

henceforth be confined, for the most part, to a comparison between that project and the present coinage.

By keeping this conclusion in view, and having regard to the qualifying circumstances which we have already noticed in general terms, we may without difficulty determine the extent to which the practice of any of the countries which have adopted decimal coins can be regarded as a precedent for ourselves.

Foreign Countries—Europe.

IV. In France, the change of coinage was part of a comprehensive scheme for the decimalization of the entire metrical system—induced to some extent by the confusion which had previously existed between the coins in circulation in different provinces, but mainly by a desire for scientific unity, combined with the same tendencies peculiar to the time, which led to the introduction of the revolutionary calendar. The previously existing coinage was, in theory, composed of three coins, the livre being equal to 20 sols or sous, and the sou to 12 deniers. But the depreciation of the currency had reduced the sou to so low a value that the subdivision into deniers had become almost useless, and the coinage may be regarded as having been composed, for all practical purposes, simply of two coins, in the ratio of 20 to 1. This would not be a convenient arrangement even without the aggravation of local irregularities. The transition was of a remarkably easy kind, the new franc being substantially the same as the old livre, and the décime being the equivalent of the double sou. The obstinacy with which old habits maintain themselves is curiously exemplified by the fact that the décime has never succeeded in supplanting the sou in retail transactions, although for all important calculations the franc and centime notation has become universal. There is little resemblance between this successful experiment of revolutionary France and the scheme which has been recommended for adoption here. They replaced a very unsatisfactory currency by a coinage limited to 100 steps with a very low maximum unit, and accompanied by decimal weights and measures; we should supplant a not inconvenient system by a coinage of 1,000 steps with a very high unit, to be used in conjunction with scales of weights and measures which are more binary and duodecimal than anything else.

App. I. p. 207–225. Gray, Ans. p. 83.

Similar observations apply to Sardinia and Belgium; and their experience is rendered still less applicable to us by the fact that the nature of their relations and intercourse with France rendered the adoption of the French coinage almost essential, irrespectively of any theoretical advantages which it might be supposed to possess. Belgium, moreover, took refuge in the French coinage from a state of confusion, in which there existed no less than four different systems of account. Such a change could scarcely fail to be felt as advantageous, whatever might be the abstract merits or demerits of the Decimal principle.

App. I. p. 225–259. App. I. p. 259–277.

Switzerland is in one respect more nearly in point for us, for there the French coinage has been introduced, while the weights and measures have only been partially decimalized. The recent modification of the Swiss coinage was, however, not a change from a non-decimal to a decimal system, but the extinction of a multitude of conflicting systems in favour of that one which had already attained the greatest circulation, and was besides recommended by the extensive intercourse existing between Switzerland and France. The success of the Swiss experiment is an illustration of the superiority of a uniform over a confused and complex system of coins, but it determines nothing as to the abstract convenience or inconvenience of the Decimal principle.

App. I. p. 276–297.

In the Netherlands, again, coins, weights, and measures are all decimalized, and there also the new system, has supplanted one of excessive confusion. In Lombardy, an Austrian decimal coinage is in use, concurrently with the French metrical system. Greece has by law a decimal coinage, but, for want of native coins, employs a medley of pieces from almost every European mint. In Tuscany, also, the decimal principle, though established by law, has never been actually carried out. The systems in Portugal and in the Kingdom of the Two Sicilies are combinations of decimal accounts with non-decimal coins—somewhat analagous to what ours would be if accounts were kept in pence or farthings, without any modification of the actual coins. Portugal, however, is now in course of transition to a complete decimal system of coins, weights, and measures.

App. I. p. 306–315. App. II. p. 125. App. I. p. 297–301. App. I. p. 327–329. App. I. p. 302–306. App. I. p. 315–319.

V. It is obvious that none of the examples we have referred to can assist us much in forming an opinion of the probable working of the pound and mil coinage, in combination with our existing weights and measures. The principal coinages remaining to be considered are those of Russia and America. In each of these countries a decimal coinage is in use, side by side with a non-decimal system of weights and measures, and no inconvenience is said to result from this seemingly inharmonious combination.

App. I. p. 301–302.

Russia, however, has possessed the same system from time immemorial; for although a change took place less than twenty years ago, it was confined to a uniform increase in

App. I. p. 320–327.

the value of all the coins, without any modification of the decimal subdivision which has always prevailed in that country. Russia, therefore, affords no data for a comparison between decimal and non-decimal systems. The essence of our investigation is the relative and not the absolute convenience of different forms of coinage; and the fact that an old-established system is pronounced by those who use it to be free from inconvenience proves little more than its antiquity. The force of habit makes any system to which people are accustomed appear convenient, and the only persons who can speak with the authority of experience in such matters are those who have had the opportunity of testing different modes of coinage.

Herschel, Ans. 3, p. 95.

An answer of Sir John Herschel to one of Lord Overstone's questions puts this truth in a striking light. After stating that our own coinage is "not inconvenient" in small retail transactions, he adds the following observations:—

"Few systems are so when people are used to them. In Holland, in 1822, I found that to change a guilder into the smallest number of pieces, it was necessary to add two stuyvers to it and get in change four 'six-stuyver pieces' (valued at $5\frac{1}{2}$ stuyvers each). I found in circulation pieces of $1\frac{1}{2}$ guilders (30 stuyvers), of 28 stuyvers, of 52 stuyvers; and in changing a Napoleon it was not unusual to get all these coins and a parcel of two-stuyver pieces, and copper doits and pfennings (8 for a penny) besides. Yet retail was practicable; nobody but myself seemed to complain; and I never heard that the Dutch found any difficulty in buying or selling over the counter or at market."

If this be—as we believe it is—a philosophical view of the force of habit in such matters, no safe inference can be derived from the complacency with which any people may regard their own coinage, unless they have had the opportunity of ascertaining the comparative convenience of different systems.

The example of Russia, however, proves this much—that a decimal coinage may be made to work concurrently with a non-decimal metrical system, without creating any such embarrassment as to be felt as a positive inconvenience. Whether such a system is more or less advantageous than our own, is a question to which we must seek the answer elsewhere.

It is not immaterial to observe also that the decimal coinage of Russia is limited to two units, one of which (the rouble) contains 100 of the other (the copeck), the smaller subdivisions being halves and quarters, not tenths of the copeck. This is one of many illustrations of what seems to be the universal law of all decimal coinages—viz., to reduce themselves to two coins of account only, the one being 100 times the value of the other, leaving the lower subdivisions to be effected by the aid of binary fractions. In France, Switzerland, and Belgium, francs and centimes; in America, dollars and cents; in Sardinia, lire and centimes; in Lombardy, lire and centesimi; in the Netherlands, guilders and cents; in Greece, drachmæ and leptæ, stand to each other in the same centesimal relation as the roubles and copecks of Russia.

United States.

App. I. p. 330–343.

VI. In some respects the United States afford a precedent more useful and instructive to us than the experience of any European nation. The alteration of their coinage, which took place upwards of 60 years ago, was a change from a system based on pounds, shillings, and pence, to a decimal division. The unit selected as the principal coin of account, though still much smaller than the pound, was nearer to it than those which have been chosen for the decimal coinages of the old world. The American coinage has, besides, established itself without necessitating a departure from weights and measures similar to our own. These are strong points of resemblance between what America has done and what is recommended at this moment here; though our imitation of the United States would, no doubt, be much closer if we were to adopt a $\frac{1}{2}d.$ or even a $1d.$ minimum as the basis of a decimal scale in lieu of the mil, which has been so much more generally recommended.

While noticing these common features, we must not omit the circumstances which distinguish our case from that of the United States. We have a uniform coinage which is acknowledged to be the most convenient non-decimal one which has ever been used, and, indeed, to be almost perfect for the purposes of paying and receiving. America was in a very different plight at the time when the transition to decimals took place. Pounds, shillings, and pence, it is true, formed the currency of every one of the States; but the pound of one State was not the pound of another, and none of them were equal in value to the pound sterling. The different Colonial Governments had depreciated the currency by paper issues in very different degrees; and when the United States became a single nation, they were driven to establish some new currency, in order to introduce a common standard of universal recognition. Besides the inconvenience

created by the depreciation of the pound, additional confusion arose from the extensive use of Spanish dollars concurrently with the coinages based on the English subdivision. Different scales of exchange from Spanish to American money existed in different States. Thus, in New England the dollar was rated at 6*s.*; in New York, at 8*s.*; in the Middle States, at 7*s.* 6*d.*; and in South Carolina as low as 4*s.* 8*d.*; the pound currency varying in like manner, from about 11*s.* to 19*s.* British money. The actual money was, moreover, almost entirely composed of paper, with the exception of a small proportion of native shillings and halfpence, and a considerable infusion of Spanish dollars and other foreign coins. We learn from Mr. Snowden, the Director of the Mint of the United States, that prior to the introduction of the present coinage, the specie circulation was a heterogeneous mixture of coins from Great Britain, Spain, Spanish America, Portugal, and France, taken and received without much exactness, at rates based on the Colonial pounds, shillings, and pence—the dollar and its parts (the half, fourth, eighth, sixteenth, fifth, tenth, and twentieth) being the prevalent coins. Snowden, App. I. p. 332.

Some change had become imperatively necessary for the sake of correcting the inconveniences of such a currency; and the case of the United States, therefore, fails to supply the example we have sought of a country deliberately rejecting a coinage as convenient as ours, purely for the sake of introducing the decimal principle. As a measure of the comparative advantages of a decimal and a good non-decimal system, the experience of the United States is of little more value than that of Russia; for it makes scarcely any difference whether the materials of comparison are altogether absent, or are so entirely different from those of our own case as to suggest no direct answer to the question we have to consider, whether a decimal system would or would not be an improvement on the present coinage of this country.

But America, though it does not supply the comparison we seek, has some useful lessons to teach us. We find a decimal coinage composed (at least by law) of dollars, dimes, cents, and mils, in all 1,000 steps, working in harmony with a system of weights and measures identical with our own. In these respects it is, except in the absolute value of its principal unit, the exact counterpart of the pound and mil scheme. But it is most important to observe how the coinage of the United States has reduced itself to a working shape. In the first place, the decimal subdivision below the cent has been absolutely rejected, and in the teeth of positive law the only division of the cent which is ever recognized in business transactions is into halves, quarters, eighths, sixteenths, thirty-seconds, and sometimes sixty-fourths, the use of this fringe of binary fractions having altogether superseded the legal dogma that one cent equals ten mils. A familiar illustration of this fact may be seen in any price current of cotton and other goods. The next change which practice has made in the theoretical currency is the virtual suppression of the dime. As a coin, it circulates to some slight extent, but it has never been treated as a coin of account, and is practically regarded, not as one dime, but as ten cents. These two departures from the contemplated system strongly support the view which is suggested by the concurrent practice of all other nations, that the only form of decimal coinage which adapts itself readily to actual transactions is one limited to two coins of account, standing to each other in the ratio of 100 to 1. App. I. Snowden, Q. 3. p. 330. Everet, Q. 3, p. 336. App. II. p.176. Kelland, Ans. 36.

The money-table of America is, by law—

10 mils = 1 cent.
10 cents = 1 dime.
10 dimes = 1 dollar.

In fact it is reduced to the simpler shape—

100 cents = 1 dollar.

The precise extent to which the dollar and cent system of accounts has, after an interval of sixty or seventy years, superseded the old modes of reckoning, is differently represented by different witnesses. There appears, however, to be no doubt that, while decimals modified in the manner we have above stated have possessed themselves of the whole field of commercial operations, the old shillings and sixpences of the provincial currencies are still retained concurrently with the legal coinage as instruments of retail reckoning. Dr. Gray states that omnibus conductors and shopkeepers in the United States persist in fixing their prices in shillings and sixpences. Mr. Goddard adds, that even where the ultimate sum is intended to be expressed in dollars and cents, shillings and sixpences are employed for the intermediate reckonings. Thus, in dealing with agricultural produce, which is commonly priced in dollars and cents, the process is said to be of this kind:— Gray, Ans. p. 81. Goddard, Ans. 20 a. p. 71.

9 bushels at 75*c.* = 9 × 4*s.* 6*d.* = 40*s.* 6*d.* = $6,75.

The Report of the Committee of the Legislative Assembly of Canada on Decimal Currency (cited in Lord Overstone's questions), confirms the statement that the Americans still cling to their shillings and sixpences. Mr. Everett observes, that an American Ques. 36. Everett, App. I., p. 338.

shopkeeper will more readily say two shillings and threepence than 37½ cents, and he (like the Rev. John Leavitt, of New York, and other witnesses) notices the fact that halves, quarters, eighths, and sixteenths of the dollar, the last two being colloquially termed shillings and sixpences, are commonly used in the business of American shops and markets. The convenience of this binary sub-division was remarked by Mr. Quincy Adams, in a Report to the Senate of the United States as early as 1821; and although the present Director of the United States Mint considers that the advantage of uniformity will more than compensate for the loss of such coins, he confirms the accuracy of the representations made as to the actual prevalence of coins formed by binary division of the dollar, and the common use of shillings as instruments of retail reckoning. The Legislature of the United States, acting upon the views entertained by Mr. Snowden, passed an Act in the year 1857, intended to effect the withdrawal of these binary coins; and we are informed by Mr. Morgan, who, as a partner in the house of Peabody and Co., is in constant communication with the United States, that during the last twelvemonth considerable progress has been made towards the exclusive use of the legal system.

App. I. Snowden, Q. 3. p. 331.

App. I., p. 341.

Morgan, App. II., p.100.

The following passage from the answers of Professor Kelland, a gentleman who has brought the highest scientific attainments to bear on an extended experience, throws much light on this part of the subject:—

App. II., p.170. Ans. 8.

"In all the parts of the States of America which I have visited, the standard coin for small transactions is the quarter dollar, which, for the sake of individualizing, is often called simply 'a quarter.' This coin is multiplied and divided. Now, unhappily, its value is 25 cents, and divisable only by 5. The inhabitants of the State of New York, and of the whole district town of Philadelphia, had been accustomed to the Old York shilling and sixpence; and having Spanish coins in the country which represented those values, they steadily adhered to these designations. This they would hardly have done so pertinaciously had not these designations represented exactly the half and quarter of their standard coin (the quarter). As these Spanish coins became scarcer, great difficulty was experienced; for instance, the New York omnibuses, the fare of which was 6¼c., or a quarter, became of necessity 6c. In the New England States, which I have not visited, the shilling is the sixth part of a dollar. This fraction, from the facility it affords in dealing with dozens and half-dozens, retains its place to a considerable degree. It is probable, however, that it will soon die out. The York shilling, on the other hand, representing the division by 4, is likely to retain its name and position in every-day transactions for generations after it has ceased to exist. The last newspaper I have received from the States as I write (Feb. 20), the *New York Dispatch* of January 24, contains six advertisements in which the prices of the goods are stated. Of these, three are simply in dollars, halves, and quarters, and may be left out of our consideration. Of the other three, one adopts the decimal system, the prices being stated at 25, 30, and 35 cents. The other two I venture to extract:—

1. 'A large quantity of sheeting, shirting, &c.:—
5 bales shirtings, 4 cents.
5 bales do., yard wide, 6¼c.
3 cases bleached shirtings, 8c.
3 cases long cloth, 9, 10, and 11c.
Marshall's New York Mills, 13c.
Dark prints, 4 and 6¼c.
Merino plaids, 1*s.* 6*d.* and 2*s.*
Yard wide flannels, 2*s.* 6*d.* and 3*s.*, worth 5*s.*
Merinos, wide width, 2*s.*, worth 3*s.*
French merinos, 4*s.*, 5*s.*, and 6*s.*
Ducal plaids 1*s.* and 1*s.* 6*d.*, worth double,' &c., &c.
(No more prices.)

2. 'Very fine French lawns, 12½ cents per yard, worth 16½c.
French kid gloves, 50c.; first quality, 62½ cents per pair.'

"The first advertisement writes 6*d.* in the form of 6¼c., and all sums above 1*s.* in shillings. The second writes all prices in cents, but the prices are respectively equal to 1*s.*, 4*s.*, and 5*s.*

"I conclude from these figures that the want of division by 2 renders the quarter dollar a most inconvenient coin in the States. The corresponding coin in the scheme proposed for this country will be the half-florin of 50 mils; and it does seem to me to be a most determined retrograde step, in a country where halves and quarters, dozens and half-dozens, are the staple terms, to discard the division of the coin into 12 pence, few and thoroughly appropriate, and to replace it by 50 cents, numerous and unaccommodating. If it be replied that dozens will give way to tens, I would ask—when? The decimal system has been the legal system in America for sixty years, and dozens have not yielded a hair's breadth as yet. The same paper from which I quote contains Valentines in lots of 144, 36, 24, 18, 12, and 3, but no tens. But why quote from New York papers? Does not their constant intercourse with England tend to keep up our terms amongst the New Yorkers? Perhaps it does; but I possess one solitary newspaper of the State of Ohio, purchased the day I spent at Cincinnati—the *Cincinnati Daily Times* of Sept. 7, 1857. Casting our eye down the advertisements of that paper, we find, first, 'For sale by the gross;' further on—

100 dozen jars,
100 dozen glass,
100 dozen cans,

Then follow 100 bags, 500 bushels, and 275 bushels; but these are for sale by the bag or the bushel, and not by the hundred. The same remark applies to an advertisement of 250 packages and

cases of goods for sale by auction, and to one or two others of the same kind. On the like principle we may pass over the advertisements of dozens of brooms, dozens of wheelbarrows, &c., where the intention is clearly not to sell by the dozen. Going on, then, we come to 'Oysters sold by the dozen,' occurring more than once; 'can tops by the gross,' &c., &c.

"Now, not one advertisement, not the most distant allusion even, do we find, which could lead us to infer that the Americans have begun to accommodate their packages to their decimal money. The word dozen, which is so simply halved, appears to retain its position by its own weight. The people are as little likely to pare it down to ten, as the Professors of the University of Edinburgh are to pare their present guinea-fees down to pounds. My predecessor drew three guineas and a crown as his fee; at my election the fee was reduced, not as the Decimalists would have reduced it, to three pounds and a crown, but to three guineas without the crown. We cannot expel the guinea, nor shall we expel the dozen.

"As I have been led, in considering this question, into an argument based on the slowness with which the people will accommodate themselves to a new system, I propose carrying that argument a step further. I have already, in my published 'Sketches,' referred to the remarkable fact that the word shilling meets your ears at every turn in many parts of the States. It is not confined to the state of New York. In Philadelphia I drank, in two days, a bottle of porter. On asking the price, the reply was 3*s*. It appears in the bill (which I enclose) as 37 cents. To satisfy ourselves of the extent to which this defiance of decimalization spreads, let us examine the American Book Catalogue. I have before me that which was issued in 1849. The Supplements I have not seen. Casting our eyes over the pages, we shall be struck with the fact that certain publishers adhere to the decimal system with tolerable strictness, whilst others abandon it altogether. Of the former class are the Harpers of New York, whose publications occupy a large space in the Catalogue. Now the Harpers carry on business in this way: on all the railroads, at all the principal hotels, they have agents for their publications. They are, in fact, gigantic hawkers, whose arms extend to every hole and corner of America. Now the local prejudices, as I have said, are not exhibited in the same form in all the States; they are different, for instance, in New England and New York. The Harpers are, consequently, driven to the decimal system, not because it is the system of any part of the States, but because, being the legal system, it is understood, and can be acted on with less inconvenience, on the average, throughout the Union.

"But let us examine the book itself, and, with the eyes of a Decimalist, turn to page 100. The first thing which arrests the attention of a mathematician on that page is—

"'Farrar's Cambridge Mathematics, 2 vols., 4,67.' Four dollars 67 cents. Why 67? Why not 65 or 70? I happen to be able to answer the question. The publishers, G. Hilliard and Co., are a Boston firm, and it happens that in Boston the people adhere to the New England shilling. Now 4 dollars 67 cents are equal to 28 New England shillings, and a purchaser going into the shop of Mr. Hilliard, and demanding the price, would be replied to in shillings rather than in dollars.

"But is there nothing for a mathematician on p. 200? Yes, there is, and it is here extracted in full:—

		d.	*c.*
North American Arithmetic, by Emerson,	Part 1,	0	10
" "	Part 2,	0	30
" "	Part 3,	0	69
" Accountant		1	50
" Do.		0	75
Northend's Book-keeping		0	63
Norton's Astronomy		2	0

"Here we have three prices common to every system, two fairly decimal, and two fairly the contrary; the one 69c. (so nearly 70) being = 5*s*. 6*d*. New York; the other, 63c. = 5*s*. New York.

"If this does not suffice to show the little advance which the decimal system has made in sixty years, with every encouragement and every facility which could be afforded by a population drawn from all quarters of the world, and bound by little force of local usage, let us endeavour to infer from the book before us, the actual prevalence of different modes of reckoning. It will be seen that we argue at a great disadvantage in this matter. The bookselling trade has certainly as little of a local character as any trade can have, even in this country: and this is still more the case in America. The Boston, Philadelphia, and New York publishers, supply not only the States, but the British provinces also. They are obliged, therefore, to make their prices intelligible to strangers, whilst the dealers in broadcloths and muslins, in tea and tobacco, are under no such compulsion. But still we will not shrink from the examination.

"To make what follows intelligible, I must premise that the strict value of a New York shilling is 12½c., and of a New England shilling 16⅔c.:—

		s.	*d.*	
Hence, 12 or 13c.	=	1	0	New York.
17	=	1	0	New England.
19	=	1	6	New York.
31	=	2	6	New York.
33–34	=	2	0	New England.
37–38	=	3	0	New York.
42	=	2	6	New England.
56	=	4	6	New York.
63	=	5	0	New York.
67	=	4	0	New England.
69	=	5	6	New York.
83–84	=	5	0	New England.
88	=	7	0	New York.

In print where fractions are omitted.

"This is a pretty long list, but the decimal list (omitting the common terms 25, 50, 75,) is longer, viz., 10, 15, 20, 30, 35, 40, 45, 55, 60, 65, 70, 80, 85, 90, 95.

"An examination of six pages of the Catalogue, viz., pp. 10, 20, 30, 100, 200, 300, gives 24 decimal prices, and 65 non-decimal.

"An examination of six pages, beginning at p. 15, viz., 15, 25, 35, 105, 205, 305, gives 16 decimal prices and 52 non-decimal.

"The twelve pages united give 40 decimal prices, and 117 non-decimal, nearly 3 to 1 against the decimal system.

"They occur as follows:—

10	at	12–13
3	„	19
2	„	28 or 2*s.* 3*d.* New York.
14	„	31
6	„	33–4
31	„	37–8
14	„	42
2	„	56
17	„	63
9	„	67
1	„	77? a misprint.
6	„	83–4
1	„	69
1	„	88

"Finally, as the most trying ordeal of the non-decimal system, let us compare the occurrence of 31 with that of 30. A person ignorant of America, but aware of the fact that the coins of the country are decimal, and that the laws uphold that system to the exclusion of all others, such a person would expect to find in book catalogues something like what he finds in this country, viz., prices expressed as much as possible in the coins of the country, or in simple multiples of them. For example, he finds in our own catalogues such prices as 3*d.*, 6*d.*, 9*d.*, 1*s.*, 1*s.* 6*d.*, 2*s.*, 2*s.* 6*d.*, 3*s.*, but rarely or never does he find a book published at 1*s.* 7*d.* or 2*s.* 11*d.* Applying the knowledge of this fact to America, he would anticipate to find 40c., occurring five times as often as 38, and 30c. ten times as often as 31. Let us then inquire what he does find. A glance will show him that 38 is a most popular price. At p. 6 of the Catalogue, for instance, out of 43 lines it occupies 14, or one-third. But where is 40? It does not occur at all; and if you examine other pages you will rarely find it, whilst 38 occurs everywhere. Why is this? Because 38c. = 3*s.* New York, a good and intelligible reason. But let us inquire into the relative positions of 31 and 30. By a careful examination of the first 50 pages, I find 31 occurs 41 times, whilst 30 occurs only 22 times. The non-decimal price (31 = 2*s.* 6*d.* New York), then, has a majority over its neighbouring decimal of 2 to 1 very nearly. I do not think it is possible to bring a stronger evidence of the want of progress of the decimal system in the United States, nor a stronger argument against meddling with our present convenient coinage."

The remarkable vitality of the English method of calculation in America, so long after the coins have been superseded by legislative enactment, has been variously explained. Some would ascribe it to the persistency of ancient habits; others to the superior convenience of the old system, at least for the purposes of retail trade. Whichever explanation is adopted, the fact is very significant. If it is owing to custom alone, it illustrates very forcibly the difficulty which we should have to face in an attempt to uproot a system so firmly established as ours is; if it is due to a real convenience in the English mode of subdividing the coinage, it suggests grave doubts whether the introduction of the decimal principle would be so unmixed a gain as its advocates imagine.

Canada.

VII. The recent permissive sanction given to the dollar and cent notation in the Province of Canada, bears some resemblance to the corresponding change in the United States. The ciculation of Canada is composed partly of English coins, partly of the colonial currency—which, though similar to ours in theory, has been long since depreciated about 20 per cent.—and partly of American dollars and cents, which are, in continually increasing quantity, making their way into the channels of Canadian business. We have already noticed the opinions of the Legislature of Canada, which a few years ago were adverse to the introduction of the American system, but since that time the opposite view has so far prevailed, that the keeping of accounts in dollars and cents has been declared legal. The inducement to this step appears to have been derived from the extensive transactions between Canada and the States, and the consequent convenience of having a common system of account. The working of the change is favourably spoken of by Mr. Draper, the Chief Justice of the Common Pleas in Canada, but the short time which has elapsed since the alteration, its incomplete and

Draper, App. II., pp. 47–54.

App. II., p. 48. 1233—1235.

merely permissive character, and the peculiar position of the country with respect to the United States, deprive the experiment of much of its value as regards ourselves. Both under the present and the earlier arrangements, Canada has been anything but an example for imitation, as may be readily seen from the following account given by Professor Kelland:—

"In British North America, prior to this year, accounts were kept in currency of £. s. d. Copper money of this currency existed, but neither silver nor gold, at least to any amount, if at all. The English 6d. was accordingly called 7½d. In the west, especially, dollar notes were abundant. But what was meant by the word 'dollar' was simply a fourth part of the £ currency; hence the American dollar was different in value from it, and English shillings, under the name of 'quarter-dollars,' formed the staple of the silver medium. At present, accounts are kept in Canada in dollars and cents; but until the Colonial Government shall issue dollars and cents, and recall the English shillings, it appears to me that they will have made no great advance in the rectification of their currency. On the other side the St. Lawrence, things are not much better; whilst in Canada West they speak of dollars and make use of shillings. In the State of New York, they speak of shillings and make use of dollars. This was the kind of experience I had: You breakfast at Toronto, and half a dollar is demanded; you tender a dollar note of the States, and it is rejected. The sum meant is 2s. English. You lunch at Prescott, and 3s. is the demand; you find it means 1s. 6d. English; you stay there a day or two. The hotel bill is 1l.; you tender a sovereign, expecting, consistently with your experience at lunch, to get back 10s., but you get back only 4s. You cross over to the States. Suppose you dine at Syracuse, New York; an extraordinary bill of fare is placed before you, priced partly in shillings, partly in cents; you take as much as amounts to 4s., and offer English shillings, but they are refused, and you have recourse to your dollar note; in return, to your no little astonishment, you receive half a dollar. I conceive then, the primary use of coins is to facilitate the arrangement of small transactions. I conceive this is best effected when some moderately-sized coin, such as a shilling, which bears a simple ratio to the large coin of account—the £—is of such a value that it will divide by 2, 4, and 8. and that to this coin is attached an independent name, so that it shall stand, as it were, on its own importance—none of which qualifications attach to the American quarter-dollar, nor, so far as I know, to any of the coins proposed by the promoters of the £ and mil system in this country." App. II., p. 170. Kelland, Ans. 4.

Opinions of Foreigners.

VIII. In referring to the information derived from foreign countries, we have hitherto confined ourselves for the most part to the facts which have been brought to our notice, without touching on the theoretical opinions contained in many of the communications, and conspicuously in those from the United States. The deductions of men of distinguished ability and position who have regarded the general question from a point of view different from our own, deserve our most careful attention. One feature is common to them all. The natives of each country betray a natural preference for their own particular form of decimal coinage, and although the abstract advantages which belong to the decimal principle in any shape are strongly insisted on, we do not find that the pound and mil scheme is regarded with much favour by any persons accustomed to the lower units of America and the continent of Europe. Mr. Alexander, of Baltimore, is so far an exception, that he seems to consider that a decimal system based on the pound would "not be unworkable," but at the same time he contemplates as the actual result of introducing the pound and mil system, that the mil, like its American counterpart, would soon be dropped, and the coinage reduced for purposes of account to the pound and its 100th part, in the same way as dollars and cents alone have survived in the United States. The high value of what would be our cent ($2\frac{2}{5}d.$) would seem, however, to put insuperable difficulties in the way of such a practical simplification of the pound and mil scheme. Mr. Snowden suggests in preference to a coinage based on the pound, the choice of 1d., ½d., or ¼d., as the minimum of our scale, and the whole current of foreign experience and opinion sets strongly in favour of a coinage limited to 100 steps, and based on such a unit as to obviate the necessity for any further subdivision, except by binary fractions corresponding to our farthings, and to the American divisions of the cent. A letter from Mr. Hincks, the Governor of Barbadoes, formerly Prime Minister of Canada, puts in an extremely clear light the advantage of selecting the ½d. as our lowest unit, and a crown of 50d. as our principal coin. We have already intimated that this is a project which we consider impracticable, at least for the present, in consequence of the strong feeling which exists against abandoning the pound; but Mr. Hincks' paper exemplifies the general tone of opinion out of England, which though decidedly favourable to the decimal principle, gives small encouragement to the particular form of it which our peculiar habits, and the prepossessions of those who have taken up the subject among us, seem to render the only one possible in this country.

App. II. Alexander, Ans. 53 c, p. 27.

App. II., Alexander, Ans. 44, 44. p. 24.

App. I., Snowdon, 37, p. 335, and Ans. 12, p. 158.

Hincks, App. I., p. 124.

Public Feeling.

IX. We have thought it a matter of considerable importance to ascertain generally the feelings with which the proposed change to a decimal system is regarded by the commercial and other classes of the community as the success of any attempted change must greatly depend on the spirit in which it would be received. Without attempting any minute analysis, we may briefly state the broad conclusions which our investigation has forced upon us.

Scientific View.

We have found among men of science a marked preponderance of opinion in favour of the decimal principle generally, and an almost equally prevalent conviction that the pound and mil scheme is the only one which can be seriously thought of. We observe also that with scarcely any exception the scientific advocates of a decimal coinage look forward to the reconstruction of our entire metrical system on a decimal footing as a probable if not an inevitable consequence of the proposed alteration of the coinage, which they appear to regard merely as the first step to a universal decimal system. At the same time they have not hesitated to pronounce in favour of decimalizing the coins even on the hypothesis that the innovation will not be followed up by any further change. In the number of eminent scientific men by whom these opinions have been expressed are the Astronomer Royal, Professor de Morgan, Sir John Herschel, Professor Miller, the late Dr. Peacock, Sir William Hamilton, and others. On the other hand, we find among those who have also regarded the subject from its scientific aspect, some, as for example, Professor Kelland, Mr. Bennett, Mr. McCulloch, Dr. Gray, and Mr. Hemming, who have expressed a decided preference for the existing coinage, mainly on the ground of its adaptability to the processes of mental arithmetic; but the weight of scientific authority is in favour of the projected change.

Educational View.

We have also found that the opinions of some gentlemen connected with education, especially with that of the poor, set strongly in favour of the introduction of decimal coins. Two advantages appear to be contemplated—one, that the coins themselves would be the best practical means of teaching the people generally, how to avail themselves of decimal calculation; the other, that by getting rid, to a certain extent, of compound arithmetic, there would be an economy of time in the education of the poor. The saving of time, however, seems to reduce itself to that which would be effected by dispensing with the teaching of the shilling and pence table. The advantage to be gained by this supposed saving of time in the education of the poor, is estimated very highly by Mr. Tufnell; but Professor Kelland, with the advantage of an intimate acquaintance with the education of the poor in Scotland, expresses a very different opinion on this point, as will be seen from the following extract from his answers:—

App. II., p. 73. Tuffnell, 1506.

Kelland, Ans. 63. App. II., p. 179.

"It has been argued that the lower classes will have a much better chance of rising under the proposed than under the existing system. It occurs to certain persons who theorize on the subject, that arithmetic, as it now stands, owes its difficulty to the monetary system; and that a tolerable knowledge of arithmetic qualifies for a clerk's or an accountant's position; so that if you improve the monetary system you offer a greater chance of rising to the poor man. Now I have no hesitation in asserting that both the premises on which this conclusion rests are alike fallacious. My acquaintance with the education of the poor in Scotland is tolerably intimate. For some eighteen years past I have acted as one of the examiners under the Dick Bequest. In that capacity I have frequently visited and tested by a severe examination the parish schools in three counties of Aberdeen, Moray, and Banff. And I have invariably found that the difficulty which is least surmountable does not lie in the compound rules. It lies mainly in the representation to the mind either of number or of relation. The following are specimens of difficult questions:—

1. To a junior class:—

Add together five million thirty thousand and seven, sixty thousand, seven thousand and five hundred;

—the question being given in words.

2. To a senior class:—

In 1852 the income tax was 7*d.* in the pound; in 1855 it was 1*s.* 4*d.* A man's clear income, after deducting the tax 1852, was 500*l*; what was it in 1855?

Or this:—

3. A goldsmith offers chains for their weight in sovereigns. Now, jewellers' gold is only $\frac{1}{24}$ths fine, and sovereigns are $\frac{22}{24}$ths. Also, a sovereign weighs 123 grains nearly. What does he charge per oz. for workmanship, &c.?

4. In France the standard of gold coin is $\frac{9}{10}$ths fine. What is the difference in value of a lb. avoirdupois of sovereigns and the same weight of Napoleons?

These are the kind of difficulties—not the compound rules. And the change of coinage will not relieve us of such difficulties; it may add to them."

Upon this branch of the subject we extract from the *North British Review* (No. lviii., Nov. 1858) some further remarks, which appear to deserve very serious consideration:—

"We wish to express as distinctly as possible our firm conviction, that Professor de Morgan is under a delusion in respect to the influence of decimal arithmetic on education. We are disposed to doubt whether a child ever begins to understand what he is doing until the tangible form in which the exchanges are made under the compound rules throws some light on the subject. In all American treatises on arithmetic which we have seen, abundance of examples are given in pounds, shillings, and pence; and many teachers endeavour to make their pupils understand the meaning of 'carrying and borrowing' by illustrations drawn from another scale than the decimal. We are willing to admit that, so far as mere acquisition is concerned, considerable saving of time would be effected by a *complete* decimalization; but we cannot admit that education would be thereby facilitated. We speak from some knowledge of the humblest schools in Scotland, and can record with pleasure the fact, that they aim at something more than the imparting of information: they try to lead the child to discover his own ignorance, and to correct it. And the science of arithmetic is one of the very best exercises of which the schoolmaster can avail himself. The effect which its mixed character produces on the lad's mind, in teaching him to think before he acts, if it goes no deeper, certainly does enable him to master the science itself. Is it not true that the English country schools, deficient as they were in our grandfathers' days, generally contrived to produce good arithmeticians? Professor de Morgan himself admits that 'the English have always shown a greater aptitude for arithmetic than our neighbours the French.' And he adds further, 'I think the English have seized the decimal notion better than their neighbours.'—(*Parliamentary Report*, 757, 759.) May not much of this superiority be due to the educating character of our monetary system?—to the constant appeal to value and change of value which it enforces?—whilst decimal arithmetic is apt to be carried on by mere unintelligent writing down."

The remarks by Mr. Bennett in his answers to Lord Overstone's questions are to the same effect:—

"The abolition of compound arithmetic is an untenable assumption, which certainly would not result from the mere 'introduction of Decimal Coinage,' and which never can be fully carried out. But even were it possible to effect it, would the advantages to education be so great or so unmixed as the theorists maintain? The object of education is the acquisition of useful knowledge, and at least three-fourths of all education is devoted, and justly devoted, to the cultivation of the memory, and the sharpening of the faculties of the mind. It might shorten the process of education, but certainly would not improve it, to limit it to the mere practical necessities of the moment. In this point of view, to cut short the multiplication-table at 10, and to make the processes of addition, subtraction, multiplication, and division as nearly as possible mechanical operations, might perhaps save some time both to master and pupil, but at the expense of cramping the child's faculties, limiting the amount of his knowledge, and obstructing his progress in life. The boy who knows no more of figures than this would amount to might possibly become a hack-clerk, and get through his mechanical work with tolerable correctness, but he would have received no instruction giving him the smallest insight into those multiplied relations of numbers which are, and must ever continue to be, of the utmost importance in the business of life."

Commercial View.

The opinions entertained in commercial circles show little earnestness and no approach to unanimity. Some attempts to collect the views of bankers and commercial men were made by Sir John Herschel while Master of the Mint, and by Messrs. Heaton and Sons of Birmingham. The results are recorded in our former Appendix, and seem to indicate no very active feeling for or against the decimal movement. We are inclined to think that mercantile men in general have scarcely begun to regard the question as one on which it is incumbent on them to form a decided opinion. To this description there are of course very numerous exceptions, and we have ourselves had the assistance of many gentlemen of large mercantile experience who have investigated the subject as eagerly and as fully as any of the scientific witnesses. The petitions which have been presented to Parliament show that a considerable number of commercial signatures have been procured by the promoters of the decimal movement; but we have some reason to doubt whether the signature of those petitions ought always to be considered as implying a strong or well-considered opinion, and we are not satisfied that those who entertain any decided convictions in favour of the project form more than a small minority of the mercantile classes.

App. I., pp. 125—137.

App. I., pp. 61–63. Gray, 417—433.

In order to obtain some further test of the feeling in business circles upon the subject, we caused a circular to be sent to the Committees of the Metropolitan Banks, to the Treasurer of the Bank of Scotland, and to the Bank of Ireland, and their replies tend to confirm our impression that except among a small minority, the idea of the proposed change meets with only a languid approval even where it is not, as is more frequently the case, regarded with

App. I., 693—700, pp. 88, 89.

absolute indifference or positive dislike. The Committee of the private City bankers have resolved that, whether in relation to their own accounts, or regarded as a question of public expediency, the inconveniences of the change would so far overbalance the advantages contemplated, that the proposed alteration is undesirable. The Committee of the Joint Stock Banks declined to express any opinion, being content to trust to the decision of the Commission. The Bank of Scotland anticipates positive disadvantage from a decimal system; and the Edinburgh and Glasgow Bank considers that the introduction of decimals would lead to an increase of labour, that it would be most unpopular, and would create great confusion and discontent in the transaction of business.

The evidence which we have obtained from gentlemen engaged in commerce who have given their attention to the subject is, upon the whole, adverse to the pound and mil scheme. Mr. Miller of the Bank of England, and Mr. Franklin, are almost alone among these witnesses in support of a Decimal Coinage based on the pound. Many of them, as Mr. J. B. Smith, M.P., Mr. Slater, Mr. Rathbone, Mr. Turner, and Mr. Yates, while disposed to regard the decimal system with more or less favour, are decided in their objections to the pound and mil scheme, while others, including Mr. Goddard, Mr. Shaw, and Mr. Julius Page, have recorded their opinions unequivocally in favour of the present coinage. A further testimony to the absence of any energetic demand for a decimal coinage among men of business is to be found in the circumstance that Lord Overstone's questions, though very extensively circulated, elicited answers from but few persons engaged in commerce.

It is not to be expected that any strong opinions should be entertained among shopkeepers and retail traders on a question which has hitherto appeared so much more theoretical than practical, and so far as our information extends, much apathy seems to prevail among the middle classes. Some apparently energetic efforts to draw forth the opinions

App. I., pp. 161—164.

of shopkeepers in a London suburb failed entirely from their lack of interest in the subject, and the witness, Mr. Minasi (himself a warm advocate of decimals), who recounted this unsuccessful attempt, declared his conviction that a large majority of the middle classes would be opposed to the change.

Official View.

The prevailing opinion within the offices of Government is not more pronounced in favour of the introduction of decimals than that of the public at large. In many departments, the principal apprehensions entertained relate to the difficulties of the transitional period rather than to the ultimate result, and we shall have to notice them more in detail when we discuss that part of the subject.

App. II., 854, 891, 892, 901, pp. 7, 8.

The Accountant-General of the Army, though foreseeing much incidental inconvenience and a probable necessity for readjusting the pay of the soldier, does not consider that the difficulties would be insurmountable.

App. II., pp. 9–21.

In the Navy Department considerable difference of opinion seems to prevail. Mr. Bromley, the Accountant-General, though he considers the change practicable, regards it with much doubt and anxiety; Mr. Collins is a little more sanguine; whilst an able paper by Mr. Reddie points out the serious objections to which the pound and mil scheme is open.

App. II., 1003, 1012, p. 25.

The Accountant of the Inland Revenue Department is inclined to recommend the experiment of decimal coinage, provided it can be effected by a gradual process, though

App. II., 1097, p. 36.

he anticipates very formidable difficulties. The Assistant Comptroller-General of the Customs would approve the pound and mil scheme, but only on condition that weights and measures were also decimalized, while the late and present Actuaries in the National Debt Office who have introduced into their office the use of decimals of the pound as a mode of calculation, are decidedly hostile to any alteration in the existing coinage, and consider that all the promised advantages may be secured without difficulty by any one who chooses to use decimal accounts.

Conclusions.

Our survey of the experience of foreign countries and of the state of opinion at home establishes these two conclusions—

1. That the history of decimal coinage abroad, though affording both instruction and warning to us, supplies no precedent so closely applicable to the circumstances of this country as to relieve us from the necessity of a rigorous independent investigation.

2. That the feeling of the country is not such as to warrant any change without the clearest evidence that it would be advantageous to all classes of the community.

It is obvious, indeed, that a radical alteration in the coinage cannot be tried as an experiment. To use the language of one of the most energetic supporters of the pound and mil scheme, "the system is not to be taken on trial: it is a demonstrated improvement or nothing." There is, as we have pointed out, no consideration *ab extrâ* which would justify us in accepting less than the strictest proof of the promised advantages. If the principle of our coinage is to be altered, it is of the utmost importance that we should be well assured that the proposed alteration will be an improvement; if that be not perfectly certain, it will not only be injudicious, but dangerous, to interfere with a system which works well, and with which the people are not dissatisfied. We shall therefore proceed to the substantial inquiry, whether or not it is conclusively established that the introduction of the pound and mil coinage would, upon the whole, promote the convenience of the community.

De Morgan, Ans. 47, p. 55.

Lord Overstone's Questions.

X. Much of the scientific and other evidence on which our judgment must be founded, is comprised in the answers to Lord Overstone's paper of questions. Those questions directed attention chiefly to the following points:—

1. The asserted superiority of 12 over 10 as the basis of a general system of mensuration, including weights, measures, and coins, on the score of the greater divisibility of the former number.

2. The expediency or otherwise of surrendering the practical convenience in the daily transactions of the market, arising from the ready divisibility of the number 12, for the sake of facilitating accounts by the use of a coinage in stricter harmony with the common arithmetical notation.

3. The objection to the adoption of 10 as the basis of the coinage without a corresponding modification of our system of weights and measures.

4. The comparative merits of different systems of decimal coinage, and in particular the advantages of a coinage built up from the penny or halfpenny, as compared with the pound and mil scheme based on a new unit, not interchangeable in value with the penny, halfpenny, and farthing.

5. The contrast between 10 and 12 as bases of the coinage in respect to harmonious adaptation to the necessary process of mankind in the division of material things, having regard to the facility of repeated bisection, and to the mechanical difficulty amounting almost to practical impossibility of effecting a decimal division of actual commodities.

6. The comparative facilities afforded by the present and a decimal coinage for the daily retail transactions of the community, that is for paying and receiving in small amounts, and especially for those mental accounts, which, perhaps, outnumber in the aggregate all the other operations with which the coinage is connected.

7. The lessons to be learned from a close examination of the working of decimal coinage in America, France, and other countries; especially from their practical adoption of a centesimal in preference to a millesimal division, even where the latter has been made the legal system, from their choice of a low rather than a high unit, and from the tenacity with which duodecimal coins have retained their hold for the purposes of huckstering traffic in countries where they have long since been superseded by law.

8. The possibility of securing many of the advantages of a decimal coinage, without the accompanying inconveniences, by means of accounts kept on a decimal system, by writing down the number of pence or otherwise, while retaining our present coins as the best fitted for the primary purpose of paying and receiving.

9. The difficulty of deciding on the advisability of establishing a decimal coinage without first determining whether it ought not to be preceded, accompanied, or followed by a decimal system of weights and measures, a point on which conflicting opinions have been expressed by Sir John Herschel, Mr. Airy, Professor de Morgan, and others. Even assuming that the simplification of our entire metrical system ought to proceed gradually on the principle of taking one step at a time, the questions suggest the necessity of determining the general direction to be given to the whole movement before taking the first irrevocable step, and point at the propriety of ascertaining whether our general system of mensuration would be most advantageously based on 10 or 12, before making a change which might prove an unfortunate obstruction to a satisfactory adjustment of our weights and measures.

We have already considered several of these points, and others will be presently discussed, but some of the questions range over a wider field than that to which we conceive ourselves to be limited. The duty committed to us, as we understand it, is simply to consider how far it may be practicable and advisable to introduce the principle of decimal division into the coinage of the United Kingdom.

This inquiry involves two distinct questons:—

1. Whether, supposing its introduction to be feasible, the decimal principle would be an improvement on the present mode of subdividing the coinage?

2. Whether any scheme can be suggested for the introduction of the principle which would not entail more inconvenience than the change is worth?

It appears to be the most convenient course to consider these two questions in the order in which they are stated above; inasmuch as the second can only arise on the assumption that the first is decided in favour of decimals, and a different order of investigation would involve the discussion of a great mass of details which might, after all, prove to be wholly irrelevant.

Besides these two points, which we are expressly enjoined to investigate, Lord Overstone's questions, as we have already observed, suggest others, which, though intimately connected with the general subject, do not seem to fall within the scope of our Commission. These topics have been more or less fully discussed in some of the evidence given before us, and especially in the replies sent in to Lord Overstone's questions; and it will therefore be convenient to state specifically the principal practical questions which have been raised. They may be reduced to the four following:—

1. Whether the decimalization of our entire metrical system, including coins, weights, and measures, is practicable and advisable?

2. If so, whether the whole should be attempted at once; or whether the change of the weights and measures should be the first step to a general decimalization; or, lastly, whether the coinage should be decimalized with a view to the ultimate adoption of decimals in the other parts of our metrical system?

3. Whether it is advisable and practicable to introduce decimal division into the coinage on the assumption that the change is to be judged by its own merits, without regard to the possibility or probability of its being followed by a more extensive introduction of the decimal system?

4. Whether the further extension of the principle of duodecimal division in our entire metrical system would not be preferable, both to the existing system, and to any practicable form of decimalization?

Of these four questions, the third (which branches out into the two distinct inquiries which we have first indicated) is the only one that appears to fall strictly within our functions; and although it was impossible that the views of the witnesses on the other questions should not, to some extent, appear, we have not sought out evidence upon them, and have not attempted to investigate them as fully as would have been necessary had they formed an integral part of our inquiry.

It is obvious that the last question, as to the expediency of extending the duodecimal principle of progression, does not fall within the scope of the instructions contained in our Commission. It is not less clear that to inquire into the first question, viz., the expediency of a universal decimalization of our metrical system, would have been to transgress the limits of the proposed investigation. The second question is wholly dependent on the conclusion to be arrived at on the first, and if this be excluded from consideration, that must be put aside together with it.

Though we have found it necessary thus to limit our inquiry, it must, at the same time, be admitted that the opinions which may be formed on any of the points referred to cannot but have considerable indirect bearing on the special subject of our investigation.

Thus, if the advantages of making a still freer use than we do at present of the number twelve could be shown to be very conspicuous, good reason might appear for rejecting a change in the direction of decimalization, although it might otherwise seem desirable. Decimals might appear at a disadvantage as compared with the best possible metrical system, even though their superiority to the existing principle, or want of principle, might be satisfactorily shown. Again, if the expediency and practicability of a general decimalization were made out, the proposed alteration of the coinage would have a value as the first step towards a larger improvement, over and above any that might belong to it, regarded as an isolated change.

If, therefore, we had considered ourselves at liberty to entertain all the questions which a large view of the subject opens up, it is possible that we might have come to a somewhat different conclusion from that to which a narrower investigation has led us, or, at any rate, that the weight of the evidence in favour of one side or the other might have preponderated in a very different degree. Notwithstanding, however, the convenience, in some respects of thus enlarging the inquiry, we have thought that to do so would be to transgress the bounds of our Commission, and we have confined ourselves to the questions, whether the adoption of the decimal principle *in the coinage alone* would be a

change for the better, and, if so, whether having regard to the difficulties of the transition, any, and which, of the suggested modes of decimalization could be advantageously adopted?

Abstract Merits of Decimal Coinage.

XI. Upon the first of these two questions—that which deals with the abstract merits of the proposed decimal coinage, and that which we now possess—we are embarrassed by very conflicting evidence. While a large body of the most eminent mathematicians in the country unite, with an almost vehement earnestness, in urging the immediate introduction of the decimal principle, in the peculiar form known as the pound and mil system, the further sifting of the question, for which this Commission was more especially appointed, has brought to light the fact, that a great weight of practical experience is ranged on the opposite side of the question, and that the support of considerable scientific authority is also given in favour of our present coinage. In our scrutiny of these conflicting opinions we shall endeavour, as much as possible, to confine ourselves to practical considerations. It is with these alone that we feel competent to deal; nor can we doubt that had it been the intention of the Crown that the decision of the question should rest upon refined scientific investigation, or be made to depend on high mathematical authority, the Commission would have been very differently constituted. We are sensible that we have no especial qualifications for the duty assigned to us except those which arise from long experience in dealing either with the public accounts of the country, or with those of extensive and important though private mercantile or monetary concerns. To some extent we are under the necessity of discussing the scientific arguments of rival mathematicians; but in this difficult part of our task our aim will be rather to exhibit an impartial summary of the reasonings on either side, than to pronounce upon the exact weight to be attributed to the conflicting arguments. The final decision cannot, and ought not to rest upon our individual opinions, whatever may be the attention we have bestowed on the subject. The utility of our labours must consist mainly in collecting the necessary information, and presenting both facts and arguments in a condensed and methodical form, calculated to aid the public in arriving at a correct understanding and forming a sound judgment on the subject. At the same time, we shall not hesitate to state the opinions we have formed on a practical view of the question, and the course which we are prepared to recommend. Postponing for the present the examination of the transitional inconveniences which would attend the change, we will consider what practical advantages and disadvantages of a permanent character would result from the introduction of the decimal principle, more especially in the particular shape of the pound and mil scheme.

The evidence on this subject may be conveniently classed under the following heads of inquiry:—

1. The comparative advantages of the present and a decimal system for the purposes of paper calculations.

2. The comparative advantages of the rival systems for the reckonings of the shop and the market, and for mental calculations generally.

3. The comparative convenience of the coins provided by the rival systems, as regards their size and value and their suitableness for paying and receiving irrespectively of the mental or other calculations which commonly attend such operations.

Under the first head, the advocates of a decimal system maintain that the proposed change would be highly beneficial, by getting rid of compound arithmetic altogether in calculations which relate to money alone, by diminishing the frequency of its use in other cases, and by disposing almost entirely of those calculations in which broken sums or measures occur in both of the quantities to be dealt with. These advantages are not denied, and clearly could not be denied, by the opponents of the change, but very different estimates are formed of the extent of the benefits which they involve.

Under the second head, the difference of opinion is much more marked. The decimalists, for the most part, assert, that the adoption of their principle would facilitate the head-work of the shop and the market as much as it would the operations of the counting-house. On the other hand, it has been strongly argued that the getting rid of compound arithmetic, even if it could be done completely, is a very doubtful advantage to the mental computer, and that the inferior divisibility of 10 as compared with 12 would, for such purposes, render a decimal system, on the whole, much less convenient than one in which the pound is divided into twenty shillings, the shilling into twelve pence, and the penny into four farthings.

Under the third head, the defenders of the present system say, that on the average of the cases which arise in retail dealings, payments can be made with more exactitude, and

with fewer coins, when the shilling is divided into twelve parts, and these, again, into halves and quarters, than with any decimal coins. They also urge that the two binary divisions at the end of our coinage are of great service in enabling the rich and the poor respectively to reckon with a minimum coin suited to their wants, the penny serving the same purpose to one class which the farthing does to another. A further objection urged against all the decimal schemes which have been proposed is, that in none of them can a good minimum coin for commercial purposes be obtained without sacrificing the pound, which it would be impossible to do. The decimalists in general maintain, that the superior convenience of the present coins for retail payments is very slight, if it exists at all. With respect to the use of penny and farthing as a double minimum, some who advocate a decimal system would have no objection to secure the same benefit by employing binary fractions of the lowest convenient unit in the decimal scale, while others regard it as a positive advantage to get rid of such anomalies as coins fractionally expressed, and insist upon a rigid adherence to decimal notation to the bottom of the scale. Professor de Morgan holds that the mere halving of the lowest unit is no disadvantage; while Sir John Herschel considers it nothing less than a tacit abrogation of the decimal system. Such striking discrepancies of opinion among the scientific advocates of decimals are very remarkable, and suggest much doubt as to the working form which the proposed decimal coinage would be likely to assume. There is some difference of opinion, too, as to the best minimum unit to be chosen; but, as we have before stated, the great majority of the decimalists are in favour of the mil, or 1000th part of the £, though the penny, halfpenny, and farthing have also been warmly advocated.

De Morgan, Ans. 47, p. 54.
Herschel, Ans. 45 (5), 47, p. 114.
Peacock, Ans. 47, p. 144.

Such is a brief summary of the position of the controversy. It remains for us to consider more in detail the several disputed points above enumerated.

On the first and third of these moot points—those relating to paper calculations, and to the relative convenience of the actual coins provided by the different systems—it is not very difficult to arrive at a conclusion, and we believe that in the evidence and arguments which have been laid before us, we have ample materials for forming a solid judgment. The second head of inquiry—that which concerns mental reckoning—has been less fully elucidated; and as, for reasons shortly to be stated, it appears to us to be by far the most important part of our investigation, and is, moreover, dependent on scientific rather than practical arguments, we have felt a corresponding degree of hesitation in pronouncing any definite opinion upon it. Before entering upon this more difficult question, we will shortly dispose of the other two.

Paper Calculations.

XII. And first, of the comparative advantages of a decimal system and the present coinage for paper calculations.

As we have already stated, it is beyond dispute that the advantage in this respect is on the side of decimals, and the substantial question is, what is the measure of their superiority. Very much ingenuity has been employed by many witnesses in exhibiting striking contrasts of the two modes of working in particular cases. We do not propose to discuss these matters with much minuteness, because we believe that a satisfactory general conclusion may be arrived at from other considerations. It will suffice to notice one example which was originally given by Sir Charles Pasley, as an illustration of the superior convenience of the decimal principle. This was to find the value of 215 tons 17 cwt. 3qrs. 9lbs. at 9*l.* 11*s.* 6¼*d.* a ton. In the 28th of the questions submitted by Lord Overstone, the sum was worked out by both methods, and it was asked whether anything was gained in such a case by the use of decimals, unless weights and measures were included in the change. The reply of almost all the advocates of a decimal system was in substance the same, viz., that no advantage appeared in the sums as worked in the question, but that if the same amount of skill were used in the decimal calculation as in the common method, some superiority would be manifest in the former. Among those who take this view, we may mention the Astronomer-Royal, Professor Miller, Sir John Herschel, and Professor de Morgan; and in the replies of the last two gentlemen, at pp. 46 and 105, the mode of working on the decimal system is exhibited in its most favourable light. Others have expressed a different opinion as to the balance of convenience in this particular instance; but upon consideration of the various answers, we are inclined to think that the example exhibits a small, but only a small superiority in the decimal mode of calculation. It is of a kind, however, which, according to the evidence of a witness who is largely engaged in trade, is never met with in actual business, the sums which do present themselves being almost always of a simpler character. But if we sought to form our opinion by a consideration of the various illustrations

Slater, Ans. 28. p. 147.

selected by the advocates of either view, the task would be interminable, and the result perhaps not very satisfactory. We will allude only to one more specific example, and that, like the former, selected by an uncompromising advocate of a decimal coinage—Professor de Morgan. In his reply to the 19th of Lord Overstone's questions, at p. 41, he proposes a calculation more than ordinarily favourable to the decimal method on account of its involving broken amounts (which are, of course, simplified by reduction to decimals) on the money side, and only a simple quantity on the other. The question is, what is the cost of 1lb., at 91*l.* 11*s.* $7\frac{3}{4}d.$ per cwt.? The working of this calculation by the ordinary book rules leads to an inference in favour of decimals; but we have not referred to it for the purpose of weighing the exact amount of their superiority in the special instance, but on account of a very important observation with which Professor de Morgan concludes his comparison. After exhibiting the decimal calculation, and then working out the sum by the common methods of compound arithmetic, he continues as follows:—

"But I confess that I have not given the easiest way of finding the price of 1 lb. at 91*l.* 11*s.* $7\frac{3}{4}d.$ per cwt. In producing that easiest way, I give the unkindest cut of all at the quarto-duodecimo-vicesimal hodge-podge. The shortest and best way of proceeding is to render 91*l.* 11*s.* $7\frac{3}{4}d.$ into florins, cents, and mils (the rule may be learnt once for all in five minutes) giving 91·582, to work as above, and to render ·818 back into 16*s.* $4\frac{1}{2}d.$ A little more consideration shows that 16*s.* $4\frac{1}{4}d.$ is nearer. I affirm, and I only wait for instances produced by antagonists to prove it, because instances chosen by myself might be suspected, that the shortest way of dealing with the *common system* is to learn the head-rule for conversion into *decimals*, to transfer the data into *decimals*, to work in *decimals*, and to transfer the *decimal* answer back into the *common system*, by the head-rule. *But this is for those who use decimals;* the world at large must learn abstract decimals from concrete coins, not the way to mend their coins from decimals."

Use of Decimals with Present Coinage.

If we put out of consideration the methods used in mental arithmetic, and restrict the observation to paper calculations, we are disposed to agree that the suggested method of reducing money to decimals, performing the required calculations, and then restoring the old notation, would, in many cases, be the best way of working with our present coins. It would certainly not be so in every kind of calculation; but for the sake of forming an estimate of the greatest possible benefit that could be derived from the introduction of the Decimal principle, we will assume hypothetically in its favour, that every paper calculation would be more conveniently performed by the method suggested by Professor de Morgan than by working throughout with £. *s.* *d.* On this supposition, we have a precise measure of the maximum gain to be secured by the introduction of decimal coins. We should save the trouble of reducing the sums dealt with to decimals at the commencement of a calculation, and bringing back the result to the common notation at the end of the work. The difference of trouble on the two systems might be much less than this in some cases, but it could never be greater, and it would in actual business be very materially reduced by the fact that any one who employed this reduction-method, and kept his accounts in decimals, would be exposed to the additional trouble, not on every calculation which he might make for his own purposes, but only on the first occasion when any sum entered into his books, and again when it became necessary to use the results arrived at, in communication with persons out of his establishment. In any counting-house in which Professor de Morgan's method was adopted with our present coinage, the clerk who kept the day-book, and the clerk who sent out accounts, would have to perform the reduction, while all that may be termed the internal calculation of the office would go on in the same way as if decimal coins were established by law. It is not easy to determine the proportion of the cases in which the reduction would have to be applied; but we are not without the means of forming a fair estimate of the labour which it would involve, even on the supposition most adverse to the present system, viz., that every calculation must be preceded and followed by the operation of reduction from or to decimals of a pound.

The view which is presented in the passage above cited from Professor de Morgan has been discussed at greater length in other papers. Theoretical considerations and practical experience have both been applied to it, and the result is to confirm Professor de Morgan's dictum, that the reduction method would (at least in many cases) be of considerable service, and at the same time to show that the amount of trouble and labour involved in it would be scarcely appreciable. Thus, in Mr. Hemming's answers to Lord Overstone's questions, we have the following passage on the subject:—

"There is no doubt that with the aid of tablets, the addition, multiplication, &c., of numbers expressed in any continuous scale of notation is a more expeditious process than when they are Ans. p.

stated in pounds, shillings, and pence; but it should not be forgotten that, without any interference with the coinage, the use of decimals is quite possible in commercial accounts. The only obstacle is the labour of reducing every sum to decimals of a pound, or to pence, or to some other single denomination, before setting it down in the day-book or ledger. The saving of this amount of trouble is all that the advocates of decimal coinage propose to effect by a change which would be useless for the purposes of mental calculation, and injurious so far as the convenience of retail transactions, is concerned. It is worth while, therefore, to consider what would be the extent of the trouble of using decimals in accounts while the present coinage was retained for other purposes. This would, after the habit was once acquired, be much less than is commonly supposed. Take any sums, say 125*l.* 18*s.* 7*d.*, or 257*l.* 19*s.* 3*d.* If these were reduced to decimals of a pound by the orthodox practice according to Cocker, the pence would have to be divided by twelve, added to the shillings, then divided by twenty, and added to the pounds. This, of course, would be an intolerably long proceeding to go through before entering an item in a book of accounts. But a much simpler process would be adopted. In the first place, the pounds and the even shillings or florins, can be converted into decimals by inspection, without anything that can be called calculation at all. Thus—

£	s.	d.		£		
125	18	7	=	125·9	+	7*d.*
257	19	3	=	257·9	+	1*s.* 3*d.*

"The conversion of the 7*d.* and the 1*s.* 3*d.*, if done by calculation, would take a little time; but it would be no great addition to the educational labours of a clerk to get up by rote the value, in decimals of a pound, (or mils), of all sums from 1*d.* up to 2*s.* What difficulty would there be in learning off the following short table?—

d.		*m.*
1	=	4
2	=	8
3	=	12
4	=	17
5	=	21
6	=	25
7	=	29
8	=	33
9	=	37
10	=	42
11	=	46
1*s.* 0*d.*	=	50

s.	*d.*		*d.*		*m.*
1	1	=	13	=	54
1	2	=	14	=	58
1	3	=	15	=	62
1	4	=	16	=	67
1	5	=	17	=	71
1	6	=	18	=	75
1	7	=	19	=	79
1	8	=	20	=	83
1	9	=	21	=	87
1	10	=	22	=	92
1	11	=	23	=	96
2	0	=	24	=	100

"But having mastered this very simple business, the conversion of £ *s. d.* into mils, or £ decimals, would be effected by writing at the end of the value of pounds and florins the equivalent for the remaining portion of the sum to be reduced, as furnished by the above table. Thus in the examples which we have already taken—

£	*s.*	*d.*		£
125	18	7	=	125·929
257	19	3	=	257·962

would be written down as fast as the pen could form the figures; and all the advantages of decimal computation would be gained without any appreciable sacrifice of time, or any addition to the labours of accountants, beyond the preliminary task of getting up once for all a short and easy table. If it were desired to be accurate as far as farthings, it would only be necessary to add one to the number of mils for each farthing in the sum to be reduced.

"When all the proposed benefits of the decimal coinage can be thus easily secured by the commercial classes without interfering with the coinage at all, it does seem unfair to embarrass retail dealings with dimes, cents, and mils, merely for the sake of relieving schoolboys and accountants from the trouble of making themselves familiar with a table, the length of which is but one-sixth of the common multiplication table—which tradition, it is true, has branded as 'vexation,' but which most boys know well enough before they are ten years old. Even the slight trouble of reducing moneys to their value in mils would, after a time, be saved in the majority of transactions, because, when once the decimal mode of keeping accounts become general, wholesale prices would commonly be stated in this form, while the £ *s. d.* notation might be retained in our shops and retail markets."

We have been anxious to ascertain how far these views are confirmed by actual experience; and we have obtained upon that point very convincing evidence from Mr. John Finlaison and Mr. A. G. Finlaison, the late and present actuaries in the National Debt Office. The following questions and answers speak for themselves:—

App. II., J. Finlaison, p. 44,

Q. 1210. "You have found it practicable to obtain all the convenience as regards calculations which can result from a decimal system, consistently with the maintenance of our present system of coinage?

A. "Decidedly so. That system was introduced by myself, and is still in operation in the National Debt Office.

Q. 1212. "Accountants are habitually accustomed to read our present system of pounds, shillings, and pence into decimals, and to read decimals back into our present monetary system with facility and quickness?

A. "In the course of a week or two they would have the table of decimals, referring to each farthing in a shilling, by heart; but if any one should have such a bad memory as that he could not remember them, why, in a little table, about six inches long and two inches broad, he could refer to it in a moment."

Q. 1213. "And through that facility it is possible to obtain all the advantages of the decimal system in abstract calculation, in combination with all the practical conveniences of our present system of coinage?

A. "Most decidedly."

The following extracts from the evidence of Mr. A. G. Finlaison are to the same effect:—

Q. 1171. "The general opinion of the advantage of a decimal system is, that it would extremely facilitate the registration of accounts, and the effecting of calculations?

App. II., A. G. Finlaison, p. 40

A. "We find a mixed system the most effective for the conduct of our business—that is, a record of the receipt of the money in pounds, shillings, and pence, and the calculation of interest and of values of annuities and stock in decimals. But our clerks are so accustomed to commute the decimal fractions of money into pounds, shillings, and pence sterling, that it occasions us no inconvenience either in changing the result of our decimal calculation into pounds, shillings, and pence; or, *vice versâ*, the pounds, shillings, and pence into the decimal form.

Q. 1172. "I understand from you that part of the calculations of your office are habitually made through the medium of decimals?

A. "They are.

Q. 1173. "Would it not be economy, in point of time, that you should not have the necessity of converting those decimal expressions of value into non-decimal expressions?

A. "With us it would not be an economy of time. They are in our memories and heads so completely that we write them down at once.

Q. 1174. "You have never occasion to write them down both decimally and non-decimally?

A. "Not as a matter of record.

Q. 1175. "So that, in no point of view, can you imagine, that the adoption of a decimal system of calculation would facilitate the work of your office?

A. "As far as calculation is concerned, we always make use of decimals; but as far as the record of the result of those calculations goes, we use the pounds, shillings, and pence.

Q. 1176. "What is the reason for that difference? Why do you not record the result of the calculation in the form in which it comes out? Why do you transfer the decimal result into the duodecimal calculation?

A. "For the convenience of record, and of information to others.

Q. 1177. "Will you have the goodness to explain to the Commission how you convert our present shillings and pence into a decimal calculation; take, for instance, 3*s.* 3*d.*?

A. "By the use of a table which is imprinted on our memories. For instance, if I am asked the decimal of 3*s.* 3*d.*, I at once reply 1·625.

Q. 1778. "That is a decimal notation which may be useful for purposes of calculation, but which it would be impossible to represent by a coinage?

A. "It would be impossible to represent the smaller divisions of decimal arithmetic in a coinage.

Q. 1179. "I believe that actuaries are habitually accustomed to the reading of pounds, shillings, and pence into decimals, and to reading off the decimal notation into pounds, shillings, and pence?

A. "Myself and assistants are so.

Q. 1180. "You can do so with the same facility with which a good linguist can interchange one language into another?

A. "With precisely the same ease.

Q. 1181. "Is that a habit which it is at all difficult to acquire?

A. "I should think it is not a difficult habit to acquire; but having insensibly acquired it myself, I am not able to speak with much decision on the point.

Q. 1182. "Do you think a more extensive acquisition of that habit would be a better mode of securing the convenience supposed to attend a decimal system of account-keeping and calculations, than the fact of abandoning our present coinage and adopting a decimal coinage for that purpose?

A. "The trouble, which I consider is but small, of acquiring the habit of rendering the ordinary system of coinage into a decimal system, and, *vice versâ*, of reconverting the results of decimal operations into sterling money denominations, is, in my opinion, not to be put for one moment in the balance against the difficulties and inconveniences attendant upon an alteration of the coinage.

Q. 1183. "By that means, facilities in calculation peculiar to the decimal system would be obtained without subjecting ourselves to the loss of those practical conveniences which attend our present system of coinage?

A. "We have all those facilities already, and I see no necessity for any public measure for changing the present system of coinage."

Mr. Morgan, the Actuary of the Equitable Assurance Society, informs us that a similar practice has been in use in their office for nearly a century, and believes that it is also followed by other Assurance Offices. He speaks very strongly as to the facility with which their clerks acquire the art of making the necessary reductions. The following are the most material portions of his evidence on this point:—

App. II., pp. 76–78.

Q. 1557. "We are desirous of knowing to what extent decimals enter into the record of the transactions at the Equitable?

A. "We keep all our accounts in decimals, except the common cash accounts that are submitted to the auditors; all our calculations and investigations are conducted by decimals.

Q. 1558. "Not only the calculations, but the record of them?

A. "And the record of them—both.

Q. 1559. "Therefore the gentlemen of your office, in acting upon your authority, have, of course, from repeated transactions, great facility in dealing with decimal operations?

A. "Yes; they all understand and are quite conversant with the decimal operation.

Q. 1560. "In many instances where they record a transaction which verbally or in writing would be represented under the £ *s.* *d.* system, have they any difficulty in recording it in decimal notation?

A. "None whatever; they convert the one into the other mentally, without any trouble.

Q. 1564. "At what age do young men generally enter into the employment of your company as clerks?

A. "From about eighteen to twenty; that is our rule.

Q. 1565. "When they enter into your service as juniors, are they, generally speaking, in the possession of sufficient facility in applying the system that you have described, at once, without further instruction than that which they may have received at the place of their education?

A. "We generally have to give them a little instruction; they pick it up with great facility.

Q. 1566. "It does not take them any considerable time—does it?

A. "No; certainly not. It is very easily acquired.

Q. 1567. "And *vice versâ*. The re-translation of your decimal account into £ *s.* *d.* is done with the same facility, I presume?

A. "Exactly; with the same facility—with equal ease.

Q. 1568. "Done mentally?

A. "Yes.

Q. 1573. "When you said that all your accounts, except the cash-accounts submitted to the auditors, were kept in decimals, did you include your cash-book, ledger, and dividend-book?

A. "Our ledger we keep in decimals; and the other accounts, by which we ascertain the state of our society, these are all kept in decimals. Pounds, shillings, and pence are converted into decimals, and added up. These accounts are very voluminous. Our ledger has a column set against each policy to record the day on which the premium was paid, and these premiums are always posted from the daily cash-book into the ledger in decimals.

Q. 1574. "But your cash-book, which I suppose would be a counterpart of your banker's cash-book—is that also kept in decimals?

A. "The daily cash-book is not kept in decimals—it tallies with the banker's book.

Q. 1575. "Then, in your communications with your customers, you do not make these communications in decimals?

A. "No; we should solve any question, or make the necessary computation in decimals, and write out the result in pounds, shillings, and pence. We use one and the other backwards and forwards. It is like a Welshman speaking English and Welsh with ease—one as much as the other.

Q. 1576. "So that, although business commences not in decimals, and concludes not in decimals, you find it convenient for the purposes of calculation to keep your accounts intermediately in decimals, and to make all your computations in decimals?

A. "Yes, that is exactly the case.

Q. 1577. "But you are able to do that in the absence of any legalized decimal system?

A. "Yes, decidedly.

Q. 1578. "In what respect would you be gainers by the compulsory legalization of a decimal system throughout the country?

A. "I do not know that we should be gainers, strictly speaking, at all, because we adopt it as it is.

Q. 1579. "So that those who value the advantages of a decimal system for the purpose of calculation, have already the power of doing as you do, using it for the purpose of calculation, which constitutes its chief excellence?

A. "They have the power undoubtedly."

We have had no evidence before us that at all runs counter to that which we have quoted, and we may therefore conclude with some confidence that, so far as accounts and paper calculations are concerned, all the facilities peculiar to decimal calculations may be obtained without any change in the coinage, and without any considerable difficulty. The sole benefit conferred by the introduction of decimal coins, as regards accounts, would therefore be, that it would compel men to adopt a mode of calculation which is already within their reach, at the cost of just so much preliminary labour as is necessary to acquire the habit of reducing our money to and from decimals of a pound by inspection and memory. That this is not done except in a few offices, as the National Debt Office, and certain Assurance Societies, only proves that the commercial world sets so small a value on the supposed convenience of decimal calculation, that it will not be at the trouble to alter habits that might be changed almost with a word. It is true that there are large classes who are not likely to learn the use of decimals until they are compelled to do so by a change in the coinage—a circumstance which deserves to be fully weighed, and to which Professor de Morgan seems to refer in the concluding sentence of the passage we have cited, when he says that "the world at large must learn abstract deci-

mals from concrete coins." But it must also be borne in mind, that those to whom decimal calculation is at present a mystery are, for the most part, persons who have less to do with paper accounts than with the mental calculations of the shop and the market. If it should appear that the common reckonings of the uneducated classes would be materially facilitated by the use of decimals, there might be some plausibility in the rather startling recommendation, that the whole coinage should be revolutionized as a means of teaching decimal calculation; but what is called the educational aspect of the question has little application to the classes who are most concerned with accounts and paper calculations. In this part of the subject, we think we ought to compare the facilities afforded by decimal coins with the best mode of handling the present coinage which arithmeticians can suggest; and unless the experience of the National Debt Office is wholly fallacious, such a comparison would exhibit a decimal coinage, so far as accounts are concerned, as a very insignificant improvement on our present system. If it were the fault of the coinage that decimal calculation is not used as generally as it might be, there would be some reason for changing it; but if the fault lies with our habits and not with our coins, the more natural and certainly the easier remedy would seem to be to adopt an improved system of account rather than to uproot the existing coinage.

Coins.

XIII. Before entering upon the difficult considerations relating to mental arithmetic, it will be convenient to dispose of the objections referred to under the third head of inquiry. These relate to the comparative merits of the coins to be found in the decimal and common systems respectively. In this respect the Decimalists do not, in general, claim any superiority for their system, and the advantage appears to us to be decidedly on the side of the present system. The comparative merits of the two systems in this respect have been contrasted with great clearness and force by the writer of the article in the *North British Review*, to which we have already referred:—

"In regard to *the selection of units*, the decimal system of necessity sacrifices every other consideration to the one prime requisite that they shall be multiples of one another by 10. In our existing system, the three coins which respectively present themselves as independent units, are the penny, the shilling, and the pound. The halfpenny and farthing are referred to the penny; the crown and half-crown, partly to the shilling and partly to the pound; and the half-sovereign, partly to the shilling and partly to the sovereign. In the proposed system, the independent units are the mil, the cent, the florin, and the pound. Now, we believe it will not be denied that the existing system has the advantage in this respect over the decimal. The former has three independent coins, the latter four. In the former, these coins are respectively in the three different current metals; in the latter this cannot be the case. The former affords facilities both for multiplication and for division; the latter for multiplication only. In the former, the intervals increase as the coins increase in value; in the latter the intervals are equal. It is true the simplicity of the construction of a decimal system, and its coincidence with that of numeral arithmetic, appear to be grounds of recommendation; but these very grounds offer their counterbalancing disadvantages as contrasted with our existing system,—the most notable of which are, the want of successive divisibility by two, and the inappropriateness of both the silver and the copper units, as coins of reference. We will endeavour to make this clear. The existing coins are constructed on the following principles:—

"*First.* Every separate coin divides by four, in terms of the next lower; so that the constantly recurring operations of halving and quartering are performed without the necessity of introducing fractions.

"*Secondly.* The ratio of each coin to the unit next above it, is an increasing ratio as the coin increases. Four is sufficient for the farthings, but a unit of fourpence would be preposterously near to the penny; and accordingly the next prime number, 3, is introduced—thus making 12 the interval between the copper and the silver unit. On the same principle, 12 would be an unnecessarily small interval between the shilling and the highest coin. And as, besides, division by three is already provided for, the next prime number, 5, is employed, making 20 the interval between the silver and the gold unit. The coins thus rise from the lowest in the simplest conceivable ascending scale—four ones, four threes, four fives. Four ones—four farthings make a penny; four threes—twelve pence make a shilling; four fives—twenty shillings make a pound. The highest coin is thereby rendered divisible, not only by 3 and by 5, but, what is of more importance, it is divisible six times over by 2. . . . . The old silver unit, the shilling, is divisible four times over by 2; the new silver unit, the half-florin or new shilling, is divisible only once by 2; the old copper unit, the penny, is divisible twice by 2; the new copper unit, the five mil piece, is not divisible by 2 at all. We need say no more. We trust we have made it clear that our existing monetary system has many great and striking advantages over its opponent. That these advantages more than counter-balance any facilities which the other may afford, in regard to certain questions of account-keeping and computation, we are firmly convinced."

The advantages of our present coinage as regards the value and size of its gold and silver units are thus pointed out by Professor Kelland:—

"3. I consider our present coins and their divisions excellently adapted to retail transactions.

They are well separated in relative value. They accommodate themselves to our ordinary dealings in respect to their absolute value. They all divide and subdivide by 2. And the middle and largest coins further divide respectively by 3 and by 5.

"The question speaks of paying and receiving. This must embrace, 1st, what is to be paid and received; and 2d, how the payment is to be made. In regard to both, I consider our system of coins excellent, better than any purely denary system can possibly be; better also on the whole than the combined denary and binary system is likely to prove. This will appear if we consider, in reference to the first point, viz., what is to be paid or received, such matters as these:—

"1st.—The admirable facility which our present coins afford for halving and quartering—processes which more than any other occur in the arrangement of small transactions.

"2d.—The fact that the shilling is of convenient size and value as the standard silver coin. The florin is too large, the cent too small. In France the franc, in America the quarter dollar, are the coins which are treated just as we treat our shilling, and we shall see by-and-by the confusion and difficulty which are entailed by an attempt to express this coin decimally. * * * * Silver is the universal pocket coinage of all classes. It becomes, therefore, of the utmost consequence that the silver coin of reference—the unit—should have its size and value carefully adjusted to the part it has to play. The conditions which it ought to fulfil appear to be these:—

"*a.* That it shall easily pack in considerable quantities, and be capable of being carried with ease about the person. To satisfy this condition, the smaller it is made the better; we know that the size of the penny is inconvenient.

"*b.* That it shall not be so small as readily to escape the eye or the touch, or the ear in falling on the ground. The threepenny piece is certainly objectionable on this account, and the sixpence appears to be the smallest admissible limit. Smaller coins are fitted to play only a subordinate part.

"*c.* That it shall be of such a value as to meet the ordinary petty payments of life without heavy multiplication or constant division. * * * * Experience has taught us that the shilling is of a size and value appropriate to this country; and the experience of America has confirmed our own. * * * *

"Admitting that the shilling is of convenient size, there is contained in the admission the basis of an argument in favour of the existing gold unit—the sovereign, for standard gold is about fourteen times as valuable as standard silver, so that, weight by weight, a gold coin will be equal in value to fourteen silver ones; but the gold is heavier than the silver in the proportion of about $17\frac{1}{2}$ to 10; hence, bulk by bulk, a gold coin is equal in value to about twenty-five silver ones. The mean between relative value by weight, 14, and relative value by size, 25, is about 20, the proportion in value which our existing coinage makes the gold unit bear to the silver one. The sovereign is thus related to the shilling in being on the one hand smaller and on the other hand heavier, in nearly the same proportion; the one unit is therefore the legitimate associate of the other."

The difficulty of getting good maximum and minimum coins is another very serious objection to decimalization. Whatever mode may be adopted, it is impossible to introduce decimals without sacrificing either the pound or the penny. If the penny be retained as a coin of account, we must work with a maximum unit of 8*s.* 4*d.*, or 4*l.* 3*s.* 4*d.* as our principal coin. Either of these would be very objectionable, both by reason of their magnitude being much less suitable for our business operations than the pound sterling, and because 8*s.* 4*d.* would make a coin too small for gold, and too large for silver. If the pound be retained we have as a minimum coin either a cent of $2\frac{2}{5}d.$, or a mil of $\frac{2}{2}\frac{4}{5}$ths of a farthing. At present, the farthing is found to be a very suitable minimum for the poor to use; and if the new system were ever naturalized, a mil would very well take its place. But in commercial affairs the penny is the recognized minimum; and it would be very objectionable to go down as low as a mil, or to neglect all sums less than $2\frac{1}{2}d.$ The suggestion that the minimum of commercial and trading accounts might come at last to be fixed at 5 mils, or half a cent, would not obviate the difficulty, inasmuch as this minimum value must be recorded in an additional column, either as 5 mils, or in the fractional form of $\frac{1}{2}$ cent, the very thing which traders have been at such pains to get rid of, by abandoning the reckoning of halfpence and farthings. We are not now speaking of difficulties of transition, or we might observe how tenacious a habit of this kind is, and how long it would be before universal consent could be obtained to the fixing of any new minimum to be adhered to in commercial dealings. An arrangement like this could not be forced by any agreement of bankers among themselves. It is only by the universal consent of their customers that they are now able to neglect sums less than a penny, not merely in the totals of their accounts, but in every single bill of exchange or other separate item. It is impossible to guess when a similar agreement would be come to with reference to any new minimum. But even when the permanent settlement was finally established, in whatever shape, the minimum adopted must involve inconveniences from which the penny is free. The truth is, that the penny for the rich, and the farthing for the poor, are about the best pair of minimum values that could be used; and any change in this respect must be for the worse.

Altogether, under the head which we are now considering, there is a decided preponderance of convenience in favour of the present coinage, not sufficient in itself to counterbalance weighty benefits, but yet deserving of serious consideration in estimating the relative value of the two systems.

Mental Calculations.

XIV. It is a difficult task to compare advantages and disadvantages so diverse in kind as those which we have seen to flow from the Decimal principle under the two heads of inquiry which we have discussed. The question—"Are more convenient accounts a sufficient set-off against less convenient coins?" is not an easy one to answer. To some minds the balance would seem to incline one way; to others, the opposite way. But it is enough, in our opinion, to say that neither the good nor the evil is of overwhelming amount; and that if (taking these two points together) there is any preponderance on either side, it is far too slight and too doubtful to justify the projected change, unless that change should be recommended also by other more important considerations.

The desirability of introducing decimals into the coinage must therefore mainly depend on the results which it would give under the remaining head of inquiry, relating to mental computations. The more the whole subject is considered, the more obvious does it become that facility of mental reckoning outweighs in importance all the other possible qualities of a system of coinage; so much so, indeed, that any decided superiority in this respect would suffice to compensate for very considerable inconveniences in other particulars. Although the superior convenience of our present coinage in some other respects is not, in our judgment, inconsiderable, the grand test of the value of the rival systems of coinage is the readiness with which they may be adapted to mental reckoning, especially to such short computations as occur on all retail purchases. Hundreds of transactions of this kind must be settled, without the aid of paper, for one calculation made with the pen. Many of these are worked, and often, it is said, very well worked, by persons not only ignorant of the processes of paper arithmetic, but unable to read and write; and we think it important to bear in mind a circumstance especially dwelt upon by Dr. Gray, Mr. Bennett, and others, that any change which would interfere with the calculations of the unlettered classes would not only affect the great majority of the population, but would fall upon persons who have not the previous education necessary to enable them to adapt themselves to a new arithmetic.

App. I., Gray, 439, p. 63. See also App. II., 1543-1544, p. 75.

In attributing such conclusive importance to this part of the inquiry, we are but repeating the sentiments more or less distinctly avowed alike by the advocates and opponents of decimalization. The following remarks, extracted from the extremely valuable paper contributed by Mr. Bennett, are not, in our opinion, at all beyond the truth:—

"I cannot hesitate for an instant to regard retail trade as the primary object to the uses of which the currency should be made subservient. The transactions of retail trade are in the proportion of at least a thousand to one to wholesale dealings; they are in a great majority of instances the subject of immediate payment in money; and they constitute the entire sum of the pecuniary dealings of the poorer and less instructed classes, as well as a large share of the dealings of all.

"I pass over a great many other points connected with the educational part of the question; but there is one which is much too important to be omitted—I allude to the process of mental arithmetic, which many acquire by habit and practice alone, and which others derive from rules given by those who have deeply studied the properties of numbers. With a very large portion, unhappily too large a portion, of the community, this is the only arithmetic possible; and yet there are few men, women, or even children of ten years old, of ordinary capacity, who cannot (although entirely uneducated, in the school sense of the term) calculate in our existing coinage all the little money questions which occur to them in daily practice. The power of mental calculation necessary for this purpose has been gradually acquired, like their knowledge of most things around them, by experience; and it seems to me that nothing short of necessity should induce us to deprive them of the fruits of this experience, and to compel them, as it were, to begin the world again with a system of ideas to which they are strangers. The same thing may be said with reference to the peculiar mental calculations connected with almost every branch of trade, the facilities for which depend entirely on the varied relations which figures bear to each other in money, weights, and measures, and which would be abolished under a decimal system. Within the last twenty or thirty years especially, the art of mental calculation has been brought to great perfection with reference to almost all the purposes of life; its great advantages are manifest; it forms an important part of the education of all who are engaged in trade; and yet it is proposed, by way of improvement, to render all the commonly practised methods of this art useless or impracticable."

Indeed, the emphasis with which almost every witness has asserted that the convenience of retail transactions would be best promoted by the system of coinage which he recommends, is in itself a very marked acknowledgment of the extreme importance of this part of the subject.

XV. The alleged superiority of a decimal progression of coins for the purpose of mental arithmetic consists only in the conformity between such a system and our common scale of arithmetical notation.

The alleged superiority of our present system depends on the fact, that the steps are made by numbers more readily divisible than 10. Thus, in passing from farthings to pence, we have 2 and 4, the two most valuable of all divisors. The relation of pence to shillings introduces the divisors 2, 3, 4, 6, and 12; and that between shillings and pounds, the divisors 2, 4, 5, 10, 20; whereas, on the decimal system, the divisors at each step would be limited to 2, 5, and 10. On the other hand, the common coinage proceeds by three irregular transitions; while all the steps used in any decimal coinage would be given by the same multiple, and that multiple the radix of our arithmetical system.

We propose to consider which of these qualities are most conducive to ready mental reckoning.

As a matter of mere authority, we find that nearly all the advocates of decimals assert that the balance of convenience, even as regards mental operations, is on their side; while those who are opposed to the change insist as strongly on the opposite opinion. But it is a circumstance not altogether to be passed over, that almost the only witnesses who have favoured us at any length with the grounds of their opinions on this point are to be found among the opponents of decimalization. This may have proceeded from an impression on the part of the Decimalists that a detailed examination of the theory or practice of mental arithmetic, which some of them were so well able to have given, would have been misplaced; but whatever may be the reason, it is the fact, that those who have discussed this question most fully before us, have all arrived at the conclusion that it would be unwise to adopt the Decimal principle. On the other side, however, are the names of men of science, who command the highest consideration; and if the subject of mental reckoning has not been very fully entered into by them, we are bound to attribute due weight to the strong terms in which they have stated their opinions that the process would be materially aided by the introduction of decimal coins. One of the questions proposed by Lord Overstone (No. 64) was especially directed to this point, and has elicited very conflicting answers. On the Decimal side, the Astronomer-Royal replies, that he believes that the decimal scale is superior for these calculations; and refers to an example given in his evidence before the Committee of the House of Commons, of which we may observe that it relates to a calculation of the price of gas, which, being sold by the 1000 feet, is, of course, most readily handled on a decimal system. Sir John Herschel, Professor Miller, and many other witnesses, take the same view; and the opinion of the late Dr. Peacock seems to have inclined in this direction. Professor de Morgan gives the following answer:—

Answers, p. 20.

Answers, p. 94—119; 120—125; 142—149.

Answer 64, p. 60.

"All the transactions of the poor will be facilitated by decimal coinage. But the questions do not come to close quarters on head-work at the broken prices which actually occur. Let any number of questions, such as concern the poor, be collected by the Commission, and solved by those who would retain the existing system in their own way. Let them concern the great articles of daily consumption, bread, cheese, meat, vegetables, beer, tea, sugar, coffee, pepper, tobacco, &c., &c. Let them be taken from actual prices; let it be stated for each whether it is to be done by pen-work or by head-work, and let the work of the common system be handed to me. I will undertake to add the way of working in the decimal system, and I will make it apparent that the medley of our weights and measures adapts itself to a decimal coinage better than to the existing coinage. A hundred or two of questions, in answer to my challenge, will be much more to the purpose than general arguments about *clean* fractions, which can only be supported upon *even* prices. The questions proposed are worthless as a trial of the actual wants of calculation of the poorer classes."

We believe that this challenge raises the true issue, and that if it resulted in proving a marked superiority in the Decimal method as applied to mental arithmetic, it would go far to establish the desirability of the proposed change, should it be found to be practicable without too serious a disturbance of existing habits. But we are not prepared to assume that the result would be such as Professor de Morgan anticipates, and we shall shortly refer to evidence which seems to render an opposite result at least equally probable.

In opposition to the opinions we have referred to, we find the superiority of our present coinage for mental reckoning asserted with equal confidence by other witnesses, including some whose business avocations have made them especially familiar with the arithmetic of the market, and others who have entered fully into the theoretical view of the subject. In the midst of such conflict of opinion we have thought it desirable to set forth, more minutely than we should otherwise have done, the considerations which have been pressed upon us on this particular point.

The arguments used by the anti-Decimalists are generally to this effect. They say that the greater facility of simple as compared with compound arithmetic, though very marked in all paper calculations, almost disappears when sums have to be worked in the

head, while the divisibility of the numbers used in the progression of coins is of very much greater importance in mental computations than when tablets are used; and they conclude that, upon the whole, it is easier to work short reckonings in the head with our present money than it would be with any decimal coins.

The following extract from Mr. Hemming's paper will give a fair idea of the general views of the anti-Decimalists upon this point:—

"All methods of calculation consist of splitting up the problem to be solved into a number of simpler computations, and then combining the results. A scale of notation is serviceable in two ways. First, it enables us to reduce any process to a number of additions, multiplications, &c., either by digits less than the radix, or by the radix or some power of it. The former are set down from memory, the latter by mere inspection. The other aid which it affords is by enabling us without any effort so to record our partial results under their heads of tens, hundreds, and the like, that they may range themselves in the positions best adapted for grouping them into a complete total; whereas in compound arithmetic, where the advantage of the regular scale is to some extent lost, we can only split an aggregate number of pence into shillings, and shillings into pounds, by an actual process of division by 12 or 20. Of these two advantages derived from a scale of notation, the latter is entirely, and the former to some extent, sacrificed in mental reckoning. The great difficulty when no tablets are used is in the recording process, and not in the minor calculations. When the intermediate steps of an arithmetical problem are set down on paper, it matters not how many are accumulated before they are combined into a single total; but the mind cannot work one subsidiary calculation, and at the same time retain any considerable number of partial results already arrived at. The mental computer must group his subsidiary calculations together step by step as he goes on, and in recording them in his memory he thinks of hundreds, thousands, and so on, as names, much in the same way as he thinks of pounds and shillings, without being either helped or hindered in this part of the process by the fact that these values may be indicated by the position assigned to the digit. I believe that Mr. Bidder, the famous calculator, learned to reckon before he knew how to use a scale of notation at all, and thus escaped the common mistake of attempting to perform arithmetical operations in the mind in the same way in which they are most readily performed on paper. The cardinal rule is to begin at what the paper calculator would call the wrong end, *i. e.*, with the highest denominations instead of the lowest unit, and the process is almost equally easy whether the problem is one of simple or compound arithmetic. Ans. p. 91.

"Examine the process with reference to the primary rules of arithmetic. In adding a long list of figures on paper, compound addition is a little more troublesome than simple, because you have every now and then to divide some large aggregate of pence or shillings by 12 or 20 instead of by 10, as in the other case; but the difference disappears in mental reckoning. Instead of taking all the pence or all the units first, the addition of the first amount to the second is completed before the third is approached, and the occasion for divisions by 12 or 20 never occurs at all, or all least only with numbers less than 24 or 40 respectively. Now, to take 12 out of 15 or 18 is as easy as to take 10 out of the same number; or, in other words, compound is by the mental process as easy as simple addition.

"In multiplication by large numbers, some benefit is derived even in mental arithmetic from having a scale of notation, but the comparison we have to institute does not much concern large numbers. It is only in the two or three last decimal places that any difference would be made by decimalizing coins. The multiplication of the pounds goes on decimally as it is, and the test of the two methods will, therefore, be to compare operations on amounts in which the pounds are limited to a single digit. Nor ought we in an experimental example to employ very large multipliers, because it is only in comparatively simple cases that the mental process is attempted. Now, let any one perform the following operations:—

		£	s.	d.				
14	×	2	2	3	and	14	×	223
9	×	3	18	6	and	9	×	3186
215	×	2	7	9	and	215	×	279

and I think he will find that although the figures are the same, the former class may be calculated mentally just as rapidly as the latter.

The one process would be,—

£ s. d.	£	
14 × 2 2 3	= 28 + 14	(2*s.* 3*d.*)
	= 29 + 8*s.* + 14	(3*d.*)
	= 29 + 8*s.* +	(3*s.* 6*d.*)
	= 29*l.* 11*s.* 6*d.*	

The other would be,—

14 × (223)	= 2800 + 14	(23)
	= 2800 + 280 + 14	(3)
	= 3080 + 42	
	= 3122	

At any rate, even in such multiplications, without the help of paper, there is no appreciable advantage derived from the use of a scale of notation. An irregular progression (if the steps are easy in themselves, as by 12 and 20) is about as easy to deal with as one by powers of 10.

"In division, the advantage conferred by a scale of notation is even less, and where the radix is not a very easily divisible number there is more than a counterbalancing inconvenience. The ordinary divisions which a man has to do in his head are in fact easier in compound than in simple arithmetic, not because the regularity of the progression by 10 is not some benefit in itself, but because 12 and 20 are more divisible than 10. I have already, in discussing the last of my five

fundamental rules,* referred to the circumstance that the tentative process, which is so troublesome in division, may be got rid of whenever the divisor is a factor of 10, and then the shortest mode of proceeding mentally is to divide first the highest denominations by themselves, then the next, and so on, each division resolving itself into mere multiplication. Precisely the same thing may be done with pounds and shillings; and as the divisors of 12 and 20 occur more frequently than those of 10, mental division is, in the majority of cases, easier in compound than in simple arithmetic."

We should gladly place side by side with this reasoning the arguments by which the advocates of a Decimal Coinage arrive at the conclusion that it would materially aid mental calculation; but, as we have already observed, that opinion, though decidedly expressed by many high authorities, is not accompanied by much general argument in its favour. On both sides, however, many particular examples have been referred to, some of which furnish additional evidence of the convenience of our present coinage in certain cases, while in others the superiority of decimals is equally obvious. It would be neither possible nor useful to review these illustrations in detail; but we may observe that there is one class of mental computations in which the advantage is palpably on the side of decimals—viz., that which concerns per-centages, commissions, interest, and the like. The following passage from the answers of Sir John Herschel displays the contrast in its strongest light. Speaking of the obstructions opposed by the present coinage to clear views in commercial, financial, and statistical discussions, he says:—

Herschel, Ans. 2, p. 95.

"A few questions will illustrate the sort of obstructions complained of—

(α) What per cent. is an income tax of 7*d.* in the pound?

(β) Who sees, when it is first proposed to him to pay 16*d.* in the pound, that this means one-fifteenth part of his income?

(γ) What is the difference to the revenue whether a duty is $7\frac{3}{4}d.$ or $9\frac{1}{2}d.$ in the pound on 50,000 cwt.?

(δ) On a population of 29 millions what is 1*s.* $5\frac{1}{4}d.$ per head?

(ε) What per cent. is 8*s.* $7\frac{1}{2}d.$ on 134*l.* 14*s.* $3\frac{1}{4}d.$?

(ζ) What annual rate of interest is $6\frac{3}{4}d.$ per cent. for 11 days?

(η) What is the rate per cent. of interest on an Exchequer Bill at $2\frac{3}{4}d.$ per diem?

Ans. p. 86.

* The following is the passage referred to:—

Even in simple arithmetic, divisibility of the radix is a very valuable quality. Thus it is much easier to divide any number, say 3494, by 5 or 25, than by 6 or 23, and the difference is especially felt if the calculation has to be performed without the assistance of paper. If tablets are used, the processes in the first two cases would be as follows:—

$$\frac{3494}{5} = \frac{2 \times (3494)}{10} = 698{\cdot}8$$

$$\frac{3494}{25} = \frac{4 \times (3494)}{100} = 139{\cdot}76$$

Although they look longer, the following processes would, perhaps, be easier in mental arithmetic:—

$$\frac{3494}{5} = \left(\frac{3000}{5} \text{ or } 600\right) + \left(\frac{400}{5} \text{ or } 80\right) + \left(\frac{90}{5} \text{ or } 18\right) + \left(\frac{4}{5} \text{ or } {\cdot}8\right)$$

$$= 698{\cdot}8$$

$$\frac{3494}{25} = \left(\frac{3000}{25} \text{ or } 120\right) + \left(\frac{400}{25} \text{ or } 16\right) + \left(\frac{90}{25} \text{ or } 3{\cdot}6\right) + \left(\frac{4}{25} \text{ or } {\cdot}16\right)$$

$$= 139{\cdot}76$$

The corresponding divisions by 6 and 23 would have to be worked as follows, whether on paper or in the head:—

$$\frac{3494}{6} = \frac{3000}{6} + \frac{480}{6} + \frac{12}{6} + \frac{3{\cdot}6}{6} + \frac{{\cdot}36}{6} +, \&c.$$

$$= 582{\cdot}66 \text{ in inf.}$$

$$\frac{3494}{23} = \frac{2300}{23} + \frac{115}{23} + \frac{23}{23} + \frac{20{\cdot}7}{23} + \frac{{\cdot}23}{23} + \frac{{\cdot}069}{23} +, \&c.$$

$$= 151{\cdot}913\ldots\ldots$$

omitting for facility all the decimals after the third place.

The great distinction between the last two examples and the former ones is, that in the latter you can only split up the total dividend into divisible quantities by a series of guesses which involve a number of tentative multiplications. In dividing by a factor of the radix or of a power of the radix, the dividend splits itself into divisible numbers without any effort, and when this is done the separate divisions can be effected by mere multiplication. The facility of dividing by a factor of the radix, or of some low power of the radix, is of immense value in mental reckoning, because the tentative mode of division interferes fatally with the retention in the memory of results previously obtained. This is an observation which will be found to bear very materially on another part of the subject which I shall presently discuss.

Division being so much more readily performed by numbers commensurate with the radix than by any others, it is obvious that that radix is, *cæteris paribus*, the best which has the largest number of factors which commonly occur as divisors. The more of such divisors there are, the easier will be the common operations

"Who does not feel that in the innumerable such cases that occur in the sort of subjects above mentioned, the system of £ *s.* *d.* is obstructive, draws off the attention unduly from the subject to the figures, and exhausts it in needless detail of calculation? In all such inquiries the use of logarithms is an immense facility; but to prepare sums for their use, a tedious and harassing preliminary reduction to pence and farthings is almost always necessary."

These observations are obviously made with reference to calculations of all kinds, and are not confined to mental work alone. Some of the questions proposed, indeed, are such as are never required to be worked off-hand; but in those marked α, β, ζ, η, we have instances in which a Decimal Coinage would greatly facilitate mental computations of very frequent occurrence. Even limiting ourselves to these, there is but little exaggeration, in one sense, in speaking as Sir John Herschel does of the "innumerable cases" which occur. Still, however large may be the absolute number of such reckonings, it must be relatively insignificant when compared with the millions of daily dealings in our retail shops. Giving all weight, therefore, to the facts to which Sir John Herschel calls attention, and fully admitting the convenience of decimals in such cases, we must still remember that these are the calculations of the affluent classes, which are seldom, if ever, required by the great mass of the population. Such a class of examples cannot therefore be regarded as furnishing the main test, or even as a considerable element in the test, by which the pretensions of the two systems should be judged. We shall therefore pass at once to the examination of that class of examples which is afforded by the retail business of the market and the shop; and inasmuch as calculations of this kind must occur in the daily experience of all classes, it is obvious that the results exhibited must far transcend in importance any that may be obtained from illustrations of narrower application.

XVI. The shop reckonings of most frequent occurrence consist in finding the values of fractions and multiples of some unit of given price. Besides these operations, addition has to be performed whenever several purchases are made at one time; but the facility of mental addition is so nearly independent of the system of coinage, that we may confine our attention to the two processes of division and multiplication. In the evidence given on this point, a host of easy cases have been selected on each side, showing an apparent superiority in one or the other principle; and it is abundantly proved that a number of sums of common occurrence may be picked out in which the difficulties of computation, either with our present coins or on the pound and mil system, become quite inappreciable. But this mode of argument, though not without its uses, is obviously insufficient to elucidate the truth. It is not a very material question *how easy* the easy cases may be, for multitudes of examples which would not check the humblest computer for a moment may readily be found on either side; but it is a matter of great importance to know what is the proportion of the easy cases to those of moderate or great difficulty on the one and the other system.

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of simple arithmetic. It is especially important that the radix should be readily divisible by the powers of two, because these occur more frequently than any other divisors. Two, four, eight, &c., are natural divisors. You can fold a piece of paper, or cut an orange into halves, quarters, eighths, and so on, with ease; it is more difficult to divide it into thirds, and still more so into fifths. The same is true of all material divisions; and as these lie at the root of much of our practical arithmetic, it is easy to understand why the powers of two occur more frequently as divisors than any other numbers. All these considerations, which would influence the choice of a radix if we were constructing a new arithmetic, apply with equal force to determine the numbers by which the progression of coins and measures may be most conveniently regulated. In the case of coins and measures there is, besides, this further advantage in the use of a good divisible number, that it enables the most commonly recurring fractions of each coin, &c., to be represented exactly by one or more inferior coins, &c., and thus facilitates the process of retail payment or subdivision as well as the act of reckoning.

In the case of coins, the special advantage of using readily divisible numbers for each progression is increased by the tendency of prices to accommodate themselves to the coinage. Such charges as 1*s.*, 1*s.* 6*d.*, 2*s.* 6*d.*, probably occur 100 times where 1*s.* 1*d.*, 1*s.* 5*d.*, 2*s.* 7*d.* occur once, and the convenience of the shilling being so easily split up into aliquot portions of pence is palpably felt in all such cases. The price of coffee ranges from 1*s.* to 3*s.*; but though 1*s.* 3*d.*, 1*s.* 4*d.*, and 1*s.* 6*d.* are common enough, I never saw coffee advertised at 1*s.* 5*d.* or 1*s.* 7*d.* per lb. The advantage of divisibility is not, however, confined to the cases where prices are adjusted to the actual coinage; there is considerable facility in small reckonings due to the divisibility of the shilling, even where a price may be fixed without reference to the convenience of calculation or to the actual coinage. Thus, it is easier to divide 13*s.* 5*d.* or 17*s.* 2*d.* mentally by 2, 3, 4, or 6, than it would be if the same sums were expressed in mils, and for this reason, that the amount is already split up into two quantities, each of which is separately divisible. To take the first example, we know at once that—

$$\tfrac{1}{3}\,(13s.\ 5d.) = 4s. + 4d. + 1d.\tfrac{2}{3} = 4s.\ 5\tfrac{1}{2}d.$$

while $\frac{1}{3}$ (665 mils) = $218\frac{1}{3}$ or 218·33 is by no means so quickly arrived at.

I have selected very simple examples, purposely to test the value of the two notations in the common transactions of common people; but it cannot be necessary to say much to show the great convenience of using easily divisible numbers for the progression of coins.

From the greater number of the witnesses we have received but little assistance in the general investigation of this point. The topic has been treated at length only in the observations at the close of a paper drawn up by Mr. Hemming at the request of Lord Overstone, and appended to this Report, the purport of it being to analyse all the answers which have been given, so far as they bear on the subject of mental reckoning. The tendency of the reasoning is to show that the easy cases for short mental reckoning must occur much more frequently with the present coinage than with any Decimal system. But though this question in all its breadth has been so slightly treated by those whose bias is in favour of a Decimal Coinage, there has been no lack on either side of particular examples in illustration of the respective merits of the two systems for the purposes of mental reckoning. Very many such examples will be found in the answers to Lord Overstone's questions, and all of them are collected and commented on in the Analysis to which we have already referred. It is perhaps not surprising that the same sums, when worked by the advocates of different systems of coinage, should be declared by each to afford strong evidence in favour of his own views. Accordingly, in the comments contained in the Analysis, almost all the examples selected by Decimalists as most adverse to the present system are said to come out more easily with £ *s.* *d.* than they would do with a Decimal Coinage. This is a point as to which those who examine the rival calculations will be able to judge for themselves. After comparing with some care the working of the examples by the partisans of both systems, we have no difficulty in saying this much,—that at any rate there is no decided superiority to be found in the Decimal principle, even when applied to mental calculations based on broken sums, selected as particularly inconvenient for the £ *s.* *d.* notation.

Analysis, p. 92—94

Analysis, Obs. 9, p. 47, 48; 17, 20, p. 48; 19, p. 55; 12, p. 69; 6, p. 72, 73, &c.

But it is difficult to draw safe general conclusions from selected examples. We have, however, some returns supplied to us of actual prices at particular times, and these, at least, should furnish an impartial test.

In the Appendix to our former Report will be found a list of prices of the principal articles of grocery, which was furnished to us by Mr. Kirkham of Liverpool. The actual prices per lb. of all these articles—viz., sugar and coffee of various qualities, cheese, butter, rice, and pepper—at the date of the return, were the following:—5*s.*, 4*s.*, 3*s.* 4*d.* to 3*s.* 8*d.*, 3*s.*,—5½*d.*, 5*d.*, 4½*d.*, 4*d.*,—1*s.* 8*d.*, 1*s.* 6*d.*, 1*s.* 4*d.*, 1*s.* 2*d.*, 1*s.*, 9*d.*, 8*d.*, 7*d.*, 6*d.*, 1*s.* 2*d.*, 10*d.*, 1*s.* 2*d.*, 4*d.*, 2*d.* There are not very many of these which would not rank among the easy amounts to deal with either by multiplication or division; and the majority of them would, we think, contrast favourably with their decimal equivalents. It is true, however, that the tendency of prices to accommodate themselves, more or less, to the coinage, might lead to a similar preponderance of the easier prices, if the Decimal system were established. But it is contended that this would not bring the pretensions of a Decimal notation up to a level with those of the existing coinage, partly because the easy prices would not be so numerous, and also because each easy price would lead to a smaller proportion of easy reckonings. In fact, there appears to be rather less difference between easy and difficult cases in decimals than with £ *s.* *d.*, and any tendency in actual prices to avoid difficult broken sums increases the proportion of simpler cases, and is so far favourable to the system in which the greatest contrast between easy and difficult prices exists. That prices are thus habitually conformed to the coinage we have Mr. Kirkham's evidence, who says that the articles (*i.e.*, in the grocery business) are rather accommodated to the price than the price to the articles. A very similar table of prices will be found in the following page of the Appendix. These are furnished by Mr. Strugnell, a London grocer, and, like the former, exhibit, for the most part, prices which lead to easy calculations. In both lists, also, we find that, as a rule, the price of the ounce is an accurate sixteenth of that of the pound, or within half a farthing of that amount—a fact which has been questioned by some of the scientific witnesses, who have sought to underrate the importance of divisibility by 16 and corresponding numbers. This tendency to mould prices to the convenience of purchasers seems, however, to be nearly confined to the grocers' trade. Butchers and bakers can scarcely practise it to any great extent; and some evidence has been given before us to the effect that drapers often follow a very different course, and habitually introduce odd farthings into their prices. The effect of this is said to be to give the shop an advantage whenever the value of the quantity sold is incapable of exact expression in coins. Even in these cases, however, it does not necessarily follow that broken sums, offering less than the average degree of facility, will be constantly met with. On the contrary, it has been pointed out that there are many amounts which, though containing odd farthings, rank among the easiest for calculation; as, for example, 1*s.* 11¾*d.*, which is a very common price, and one almost as easy to multiply as 2*s.*, and exactly equivalent to it for divisional reckoning.

App. I., p. 165.

Analysis, pp. 92—94.

App. I. p. 166. See also App. II., 1705, p. 88.

We find in the evidence other illustrations, taken from actual business, which seem to confirm the view suggested by the facts to which we have referred. The whole subject of mental reckoning is most ably discussed in Mr. Bennett's paper, and much practical information with respect to the arithmetic of trade is contained in the evidence of Messrs. Slater, sen. and jun. These gentlemen have had large experience, in the course of their business, of the extent to which special mental processes are used, and of the facility afforded by the actual coinage. They are tolerably free from bias in favour of the present system; for although decidedly adverse to the pound and mil method, they are not hostile to the Decimal principle, if based on the penny instead of the pound. Their judgment in favour of £ *s. d.*, as regards convenience of mental calculation, is therefore the more valuable; and upon this point they have given very suggestive evidence.

Answers, pp. 21—27. Appendix I. pp. 1—24. Answers, pp. 145—153 Appendix I. p. 15 *et seq.*

Answers, pp. 146—150.

Before concluding our references to the practical part of the evidence on the subject of mental arithmetic, we must notice what is perhaps the most instructive illustration of any. This is a page taken from the books of a butcher, and selected from an extremely large number of accounts, by Mr. W. Miller, the cashier of the Bank of England (a strong advocate of decimalization), as a fair specimen of ordinary working. We give the table, with Mr. Miller's comparisons of the working on the present, and the pound and mil systems, omitting only so much as assumes weights to be decimalized as well as coins, as that would carry us beyond the scope of our inquiry:—

Miller, Answer 6, p. 127.

"I have examined the small books that pass between butchers and their customers in various parts of London and the districts round, and they all tell the same tale, whether you take Giblett's of Bond-street, Bannister's in the City, or any of the suburban tradesmen's books. There is a slight difference in the prices, but the principles upon which the business is transacted are precisely the same.

Answer, pp. 126—127.

"Out of upwards of 3,000 entries, there is not a single instance of weighing below two ounces, except in the case of a steak, or chop, or veal cutlet, where the weight has been below a pound.

"The following is a page from one of the books, and is a fair specimen of the ordinary working:—

		A. As it is.			B. As it would be with Decimal Coins.		
1853.		Weight.	Price per lb.		Weight.	Price per lb.	
		lbs.		£ s. d.	lbs.		£ F. M.
April 25	1. Shoulder of lamb	5½ oz.	11*d.*	0 5 0	5½ oz.	46	0 2 53
„ „	2. Beefsteak	1 14	8*d.*	0 1 3	1 14	33	0 0 63
„ 26	3. Rumpsteak	1¾	1*s.*	0 1 9	1¾	50	0 0 87
„ 27	4. Leg of mutton	8¾	8½*d.*	0 6 2½	8¾	36	0 3 15
May 2	5. Fillet of veal	8¼ oz.	10*d.*	0 6 10½	8¼ oz.	42	0 3 46
„ 4	6. Lamb chops	1 6	1*s.*	0 1 4½	1 6	50	0 0 70
„ „	7. Suet	½	8*d.*	0 0 4	½	33	0 0 17
„ 5	8. Calves' liver	1½	8*d.*	0 1 0	1½	33	0 0 50
„ „	9. Leg of mutton	8½	8½*d.*	0 6 0½	8½	35	0 2 98
„ „	10. Leg of lamb	5	10*d.*	0 4 2	5	41	0 2 05
„ „	11. Suet	½	8*d.*	0 0 4	½	33	0 0 17
„ „	12. Brisket of beef	8	7*d.*	0 4 8	8	29	0 2 32
				1 19 0			1 9 53

"Let us examine what difficulties there are attending all three* systems in working out these reckonings by head, supposing that they were purchases made in the market to be reckoned instanter.

"A 1. 5½lbs. at 11*d.* Half is 5½*d.*, and 5 × 11 = 55, and 55 + 5½*d.* = 60½*d.*, which, by the pence table, we know to be 5*s.* 0½*d.*

"B 1. 5½lbs. at 46 *m.* Half is 23, and 5 × 6 = 30, which, +23 = 53, and 5 × 40 = 200, and 200 + 23 = 253.

"A 2. 1lb. 14 oz. at 8*d.* = 2 lb. − ⅛th, and 8*d.* ÷ 8 = 1*d.*, and 8*d.* × 2 = 16*d.*, and 16 − 1*d.* = 15, and 15*d.* = 1*s.* 3*d.*

"B 2. 1lb. 14 oz. at 33 *m.* = 2 lb. − ⅛th, and 33 ÷ 8 = 4, and 33 × 2 = 66, and 66 − 4 = 62.

"A 4. 8¾ lbs. at 8½*d.* Call it 9 lbs. − ¼. Then ¼ = 2*d.*, and 9 × 8*d.* = 72*d.*, and 72*d.* = 6*s.*, and 9 × ½*d.* = 4½*d.*, and 4½ + 6*s.* = 6·4½, and 6*s.* 4½*d.* − 2*d.* = 6*s.* 2½*d.*

"B 4. 8¾ lbs. at 36 mils. Call it 9 lbs. − ¼. Then 36 mils ÷ 4 = 9 mils, and 36 × 9 lbs. − 9 mils = 315.

* The third system referred to is that where both coins and weights are decimal.

"Enough is here given to show that, even in these most trying cases, a decimal coinage is worked by head, and by a head burdened by the pence table, with more facility than the present admits of. It is true there are insignificant fractions of a mil occasionally thrown over—there are the same in the pence, but they are of no consequence to any one; and the great advantage of displacing a system of makeshifts, learned by rote, special and technical, for one purely arithmetical, and of universal application, is not to be overlooked."

Mr. Miller, it will be seen, has tried some of these small reckonings by both methods, and considers that they may be worked by head in decimals with more facility than the present coinage admits of. In these, as in almost all the other examples which have been proposed, the result of the comparison seems to depend very much on the previous bias of the calculator, for we find the same sums worked in the Analysis to which we have before referred, and the advantage claimed with equal confidence on the other side. We extract the passage, so as to exhibit the grounds on which such opposite conclusions have been drawn from the same examples:—

"But Mr. Miller gives an example, which he considers a fair selection, from a very large number of actual cases. Practical tests of this kind are so much more important than any others, that I will examine in some detail how far Mr. Miller's conclusion in favour of decimals is justified by his own illustration.

Analysis, Q. 6, pp. 72—74.

"His work is open to two material observations. One is, that he exhibits the 1st, 2d, and 4th cases, passing over the 3rd, where the price happens to be 1*s.*, which is especially favourable to the present coins. The other (which is more important) is that, although professing to compare the head-work of the two notations, he (like almost all the other witnesses who have drawn conclusions unfavourable to the £ *s. d.* notation) employs in the £ *s. d.* work the methods of paper calculation, which are wholly unsuited to mental reckoning. His inferences would have been very different if he had worked his examples as people do work such sums in real transactions—*i.e.*, somewhat as follows:—

"A 1. To find $5\frac{1}{2}$ lbs. at 11*d.* At 1*s.* is 5*s.* 6*d.* less at 1*d.* is $5\frac{1}{2}d.$ = 5*s.* $0\frac{1}{2}d.$

which is much easier and shorter than Mr. Miller's decimal work, given as B. 1. Again, take—

"A 2. 1 lb. 14 oz. at 8*d.* 2 lbs. is 1*s.* 4*d.* less 2 oz. = 1*d.* = 1*s.* 3*d.*

which is, in fact, Mr. Miller's treatment, except that he introduces distinct steps to say that $\frac{1}{8}$ 8*d.* = 1*d.* and that 15*d.* = 1*s.* 3*d.*; and, moreover, begins, paper fashion, at the wrong end. However, thus treated, the work is rather simpler than the decimal reckoning, B 2.

"Take now the 3d case, which Mr. Miller omits:—

"A 3. $1\frac{3}{4}$ at 1*s.* is 1*s.* 9*d.*, it being impossible to put down any intermediate step.

"B 3. $1\frac{3}{4}$ lb. at 50. 1 lb. is 50, and $\frac{1}{4}$ 50 is $12\frac{1}{2}$.

$\frac{3}{4}$ 50 is $36 + \frac{3}{0} = 37+$.

$1\frac{3}{4}$ at 50 is 87+.

"Lastly, in the 4th case, which is more complicated than the others with either coinage—

"A 4. $8\frac{3}{4}$ lbs. at $8\frac{1}{2}d.$ 8 lbs. is $64d. + 4d. = 68d.$

and $\frac{3}{4}$ ($8\frac{1}{2}d.$) is $6 + \frac{3}{8}$ make $74\frac{1}{2}-$.

$= 6s.\ 2\frac{1}{2}d.-$.

"This is easier in the head than the decimal method given by Mr. Miller; and it is moreover, observable that Mr. Miller's process is, in fact, an abandonment of the advantages peculiar to decimals, and an adoption of the class of devices in which they can never compete with a notation like our own. Such short-cuts are, no doubt, as legitimate on one side as the other; but to use them frequently with decimal coins would be equivalent to giving up the contest; for the strength of the present system is, the greater readiness with which it furnishes these short-cuts to a result; the strength of decimals, on the contrary, consists in the universal applicability of the regular processes of simple arithmetic, and the possibility of doing without short-cuts at all. To use them at all freely is, in fact, to admit that for head-work the quality in which decimals are inferior to £ *s. d.* is (even when exhibited in a very imperfect form) of more value than the quality which forms the only recommendation of the decimal principle.

"If the questions were to be decided by the examples which Mr. Miller has worked, there could be no doubt that, for mental calculation, the existing coinage offers far greater facilities than the pound and mil notation.

"The working of the remaining examples of Mr. Miller's Butcher's Bill is quite as much in favour of the present coinage as that of those which he has given at length. It may be shortly stated as follows, imitating, as nearly as possible, Mr. Miller's treatment in the decimal reckoning:—

"A 5. $8\frac{1}{4}$ at 10*d.* At 1*s.* is 8*s.* 3*d.* less at $2d. = 16\frac{1}{2}$ or 1*s.* $4\frac{1}{2}d.$, gives 6*s.* $10\frac{1}{2}d.$

"B 5. $8\frac{1}{4}$ at 42. $\frac{1}{4}$ is $10\frac{1}{2}$, and 8×2 is 16, makes $26\frac{1}{2}$, and $8 \times 40 = 320$, makes 346+

"Not a particularly favourable case for decimals.

"A 6. 1 lb. 6 oz. at 1*s.* 1 lb. 4 oz. = 1*s.* 3*d.*, and 2 oz. = $\frac{1}{8}$ 1*s.* or $1\frac{1}{2}d.$, makes 1*s.* $4\frac{1}{2}d.$

"B 6. 1 lb. 6 oz. at 50. 6 oz. = $\frac{6}{16}$ 50 = $\frac{3}{8}$ $12\frac{1}{2} = 3 \times 6\frac{1}{4} = 18\frac{3}{4}$, and 1 lb. = 50, makes $68\frac{3}{4}$ or 69—.

"I have been obliged in this case to import the fractional treatment into the decimal work. Any other handling would have been intolerable; and this is enormously longer and more troublesome (in the head) than the common work of A 6. I observe that Mr. Miller has got a wrong result in this case, which is not surprising if he worked it decimally, without paper.

"A 7. $\frac{1}{2}$ at 8*d.* is 4*d.*

"B 7. $\frac{1}{2}$ at 33 is 17—.

"Both easy enough, but the former certainly the easier.

"A 8. $1\frac{1}{2}$ at 8*d.* is 1*s.*

"B 8. $1\frac{1}{2}$ at 33. $\frac{1}{2}$ is 17—, and 33 makes 50—.

"The £ *s. d.* work undoubtedly the easier.

"A 9. $8\frac{1}{2}$ at $8\frac{1}{2}d.$ 8 lbs. $=64+4=68$, and $\frac{1}{2}=4\frac{1}{4}d.$, makes $72\frac{1}{4}$ or 6*s.* $0\frac{1}{4}d.$

"B 9. $8\frac{1}{2}$ at 35. $\frac{1}{2}$ is $17\frac{1}{2}$, and 8×5 is 40, make $57\frac{1}{2}$, and 8×30 is 240; make 297+, or 298—.

"Also a case decidedly in favour of £ *s. d.*

"A 10. 5 at 10*d.* is 50*d.* or 4*s.* 2*d.*

"B 10. 5 at 41 is 5 and $5\times40=200$, makes 205.

"Both easy enough.

"A 11. $\frac{1}{2}$ at 8*d.* } Same as No. 7.

"B 11. $\frac{1}{2}$ at 33. }

"A 12. 8 at 7*d.* is $56d.=4s.\ 8d.$

"B 12. 8 at 29 is $8\times9=72$, and $8\times20=160$, make 232.

"This is pretty easy; but the chance of a blunder in working decimally would be ten times as great as on the common system. The difference is one which will perpetually occur, as it arises from the circumstance that higher numbers have to be dealt with, when the fractional mode of representing two denominations in one is departed from. If, again, to remedy this inconvenience, the fractional method is imported into decimals, it will confessedly not work nearly so readily as with 12*d.* to the shilling. Examples A 6, B 6, illustrate this.

"I believe that Mr. Miller is quite right in saying that the page he has chosen is 'a fair specimen.' But can any one doubt that, if this is so, the superiority of our coinage over decimals, for the mental work of the shop, is conclusively established? Out of the twelve examples, there is scarcely one in which the superiority of £ *s. d.* is not conspicuous, and in some it is very considerable; while there is not one instance which, when properly worked, shows any advantage on the decimal side."

These extracts will speak for themselves, and relieve us from the necessity of comparing in detail the facilities afforded by the rival methods. The reply given in the Analysis is certainly in one respect justified, for we think it is clearly shown that the answer did not exhibit the mental reckoning in working with the present coinage in its most favourable light. A number of similar comparisons between the decimal and non-decimal modes of calculation, as exhibited by advocates of either system, will be found collected in the pages of the Analysis. Some of these examples raise a question of general application, which is much dwelt upon throughout the Analysis. The point insisted on is, that the only real difficulty in mental reckoning is occasioned by the strain upon the memory, and that mental computations with £ *s. d.* demand, in average cases, less effort of memory than the corresponding sums worked in pounds and mils. It is impossible to exaggerate the importance of the position thus contended for. It lies at the root of the whole question, so far as facilities of mental reckoning are concerned; but the reasoning depends too much on an examination of particular examples to be discussed in detail here. It will suffice to refer to the Analysis generally, and in particular to the observations at pp. 47, 48, on Mr. Airy's answer to the ninth question, where the point is most fully examined. In this and other passages, there is much to bear out the assertion that the stress on the memory in mental reckoning would be increased rather than diminished by the introduction of a decimal coinage.

We do not, however, feel called upon to weigh in golden scales the arguments on either side. It is enough for the purpose of our inquiry to know that there is no greatly preponderating superiority in the Decimal principle. Indeed, if there had been any ground for saying that the introduction of decimal coins would very decidedly facilitate average mental reckonings, the many able advocates of decimalization would not have allowed the existence of so important a recommendation of their scheme to remain, as it does upon the evidence before us, doubtful, if not disproved. Certainly, we have heard nothing to justify the conclusion that any great benefit of this kind would be derived from the change, even if we ought not to conclude that the effect would be to deprive the great majority of the population of facilities for mental computation which they now enjoy. We have already said, that unless some decided advantage in this respect could be reasonably anticipated, we see no sufficient motive for disturbing the existing coinage; and we are, therefore, not prepared to recommend a change in the direction of decimals, even if the experiment could be made without occasioning any temporary inconveniences, or involving any violence to established habits, or any injustice to persons whose dealings have adjusted themselves on the basis of the present coinage.

Transitional Difficulties.

XVII. This conclusion is materially strengthened by a consideration of the transitional difficulties which threaten to attend the proposed change. Our conviction that neither

the necessity nor the advantage of introducing a decimal coinage is satisfactorily made out, would not indeed be shaken, even if it should appear that the temporary inconveniences were likely to be much less serious than has been supposed; and it is, therefore, not absolutely necessary to plunge into the details of the controversy as to the nature and extent of the obstacles which the project would have to surmount. It seems, however, desirable that we should express the opinion we have formed on this part also of the question. Speaking in general terms, we may say that though we do not consider the transitional obstacles as insurmountable, they appear to us to present more formidable difficulties than we should be prepared to encounter, without a prospect of ultimate benefit greater than even the most sanguine advocates of decimals have ventured to predict.

Moral Difficulties.

One very serious obstacle to any change in an established and convenient coinage is found in the obstinacy with which old habits, in such matters, struggle to maintain themselves in opposition to a new system. To unlearn is far more difficult than to learn. Notwithstanding the minute nature of the change by which a Decimal Coinage was introduced in France, and the peculiar circumstances which favoured the experiment, an interval of more than sixty years has not sufficed to induce the people to abandon the old division of the livre or franc into twenty parts; and one witness mentions the surprise of an American, familiar with decimals in his own country, who "went to France with the idea that they had a Decimal Coinage," but found that "somehow the sous always got in his way." Not only is the sou universally to be met with, but in some parts of France, as Britanny and Auvergne, the old system of nomenclature has been retained in its integrity, and much of the old money still remains in circulation. In America, after an equally long interval, the habit of dealing and reckoning with shillings and sixpences, represented by the binary fractions of the Spanish dollar, survives to the present day. In Belgium, where the French coinage was introduced in the last century, and finally established by the law of 1832, the transition has been so imperfectly effected, that we are informed that "in usual life, every man in Belgium is compelled to have constantly at hand his tables of reduction of the various moneys, both past and present." At Antwerp, goods are bought and sold in Netherlands money, though, in deference to the law, public sales take place in francs and centimes. The majority of merchants are said to have adopted the legal system of accounts; but small sums connected with the people's daily dealings are generally mentioned in Brabant guilders and stuyvers; farmers and small shopkeepers, especially in the Flemish provinces, still continuing to use the old denominations of coin. Ancient usages have shown the same tenacity with regard to the weights and measures. Thus, in Antwerp and other places, the new metrical system has been long at work for large transactions; but, with the country people, and the lower orders in the towns, the old weights and measures are described as still the order of the day, and the new ones as hardly spoken of. This has happened, notwithstanding that the possession of old weights and measures has been made a misdemeanour, for which the law provides, and actually inflicts fines and punishments. Even on the Antwerp Exchange, it appears that grain still sells in Brabant guilders, and that sugar refiners put themselves to much trouble for the sake of weighing by the old Antwerp pound. Something analagous to this is to be seen in the prevalence of a multitude of local measures of grain and other commodities, which are still preferred in many parts of the United Kingdom to the imperial bushel. Cornish and Appleby bushels, lestrads, nobbetts, bolls and combes, bushels at $6\frac{1}{2}$ instead of 8 to the quarter, and loads of a multitude of different weights, are among the local eccentricities which have refused to give way to a uniform scale. Similar indications of the force of habit and routine are conspicuous in the experience of many other countries. At the same time, it must be observed, that the change to a new coinage has in many cases been so far effectual as to have banished the old reckonings from the larger operations of commerce, and, to a greater or less extent, from the smaller transactions of the retail markets. In France and America, the experiment has at length been attended with considerable though still imperfect success. In Belgium and other countries, on the contrary, it is only not an absolute failure, because the confusion which previously existed was so great as scarcely to admit of aggravation. In some other States, the legal establishment of a Decimal Coinage has succumbed to old habits, or been suffered to remain a dead letter; and the unsatisfactory result has been produced of one set of coins of account alone recognized by law, and a totally different one exclusively employed by the people. Everywhere habit has been found an obstinate enemy, even when every theoretical consideration was in favour of innovation.

App. I. Gray, p. 59, App. I. p. 27. St. Hilaire.

App. I. Baring. pp. 272, 273.

Whatever difficulties have been met with elsewhere from this source must be felt in a much higher degree by us, if the experiment of a pound and mil coinage should be tried. Two circumstances which were not combined in the case of any other country must be expected to increase the resistance to the change beyond anything hitherto experienced. We shall have to displace a uniform coinage of enormous amount, solidly established without a rival in the habits of the people, and recommended by the facilities which it affords for retail dealing. To replace this, we shall have to introduce a new set of coins, not practically interchangeable with those now in use, and based on a millesimal division, of the successful working of which no instance can be found. That the object might be attained after a lengthened period of transition, is possible; but we should not expect any very complete success until after the lapse of many years, during which a most inconvenient conflict would be maintained between the old and the new systems.

A Decimal System founded on the penny would in many important respects be less difficult to introduce, though the determination with which the advocates of the decimal principle cling to the pound sterling puts that form of coinage for the present, at any rate, out of the question. This circumstance is, however, one of the strongest proofs of the difficulty presented by established habits. If the educated classes are so much under the dominion of custom as to be unable to reconcile themselves to a system not incommensurable with the present coinage, though it rejects the pound as the principal unit, how much more severely must the lower classes feel a change which not only abolishes their most important unit, the penny, but substitutes new coins in which no equivalent can be found for the majority of sums expressed in broken money of shillings and halfpence. "Mental arithmetic," says Dr. Gray, "is one of the things which the poorer class of people particularly attend to; it is so useful and familiar to them that many can reckon extremely well who cannot either read or much less write, and the whole of that information which has cost them many years to obtain would be rendered useless by the change;" and, in another passage, the same witness enumerates a variety of special rules of calculation dependent on the form of the present coinage, all of which would be entirely altered by a change in the system of coinage. "Mental arithmetic," he concludes, "as now taught, would be utterly destroyed." Even if we were to assume that new and equally convenient methods would be gradually invented as the pound and mil system established itself—a hypothesis which, to say the least, is open to much doubt—the present generation of the poorer classes could hardly be expected to educate themselves in a new art, and would probably persist in reckoning by the old methods, as long as a penny was to be got or the recollection of such a coin survived. We have before cited a passage from the answers of Mr. Bennett, which deals with this subject in a philosophical spirit; and we think there is much reason in his observation, that "nothing short of necessity should induce us to deprive the poor of the fruits of their experience, and to compel them to begin the world again with a system of ideas to which they are strangers." Nor, if the attempt were made, should we look for substantial success until after a long period of hardship and inconvenience, during which the prohibitions of the law would have to maintain an invidious struggle against the prepossessions and habits of the people.

App. I. pp. 63—65. Gray, 439.

App. I. p. 65. Gray, 456.

The advantages to be derived from a Decimal Coinage ought to be very great to justify the commencement of such a contest; and before adopting the pound and mil system in particular, some more satisfactory explanation than we have yet heard ought certainly to be given why, in the choice of a unit, the associations of the rich should be more respected than the less easily changed habits of the uneducated classes.

The extent of the passive resistance to be anticipated must be, in some measure, matter of conjecture. We have, it is true, very satisfactory accounts from gentlemen who have been engaged in large works, in France and other countries, of the readiness with which the English labourers whom they have taken abroad have made themselves familiar with foreign coinages, and of the absence of any complaints of inconvenience arising from this source. But the position of a limited number of men who have adventured into foreign countries under the inducement of high wages is entirely different from that of a whole people whose habits are changed by a sudden stroke of legislation. The man who goes abroad is prepared to find strange customs, which he must learn to adopt; and it is comparatively easy for him to acquire habits on the spot, where they are already naturalized. The case is very different when a novelty of this kind, instead of being voluntarily sought by a few enterprising wanderers, is forced upon a population who have no inducement to accept without complaint a change which they neither desire nor understand. Most of the energetic supporters of the £ and mil scheme speak rather lightly of the difficulty of uprooting old habits; but other witnesses have, we think with more justice, taken a very different view of the obstacles which would present themselves. Mr. Rathbone states that he has been much struck with the extreme tenacity with which

Fox, App. II. p. 103. Locke, App. II. p. 93.

App. I. p. 75. Rathbone, 538.

people, and the lower classes in particular, ever cling to their familiar and established coins and values, and thinks that extreme and obstinate resistance would be encountered, and that the attempted change would be of a permanently injurious character, from the impossibility of ever making it thorough and perfect. Even Sir John Herschel, though a decided advocate of the change, estimates very highly the vitality of the habits which would have to be eradicated. But such differences of opinion relate only to a question of degree. All must admit that it is a tedious and troublesome task to alter the daily course of dealing of a whole people; and the unprecedented violence of the transition from our present coinage to a form so essentially different as that of the £ and mil scheme, may fairly be expected to produce even greater difficulties than those which have been encountered in Belgium and other countries.

Mechanical Difficulties.

XVIII. Besides the obstacles derived from old associations and settled habits, which would prevent or delay the final settlement of the coinage on a new basis, there are other drawbacks to be considered, which may be called mechanical difficulties, most of which apply peculiarly to the form of coinage on which the Decimalists have concentrated their attention.

A new system of decimal coins commensurable throughout with our present moneys (as a decimal coinage with a penny or halfpenny unit would be), might be introduced with no other difficulty than that which the force of habit would oppose to any change. It is very different with the pound and mil project. The only coins which could possibly take the place of the penny would be four-mil or five-mil pieces; the former would be 4 per cent less, the latter 20 per cent. more, than an exact equivalent.

Much inconvenience involving some injustice in many individual cases would be the inevitable consequence. Every one who was entitled by contract or accustomed in course of trade to receive a penny, would either lose a part of his due, or would receive more than he had stipulated for. A compulsory alteration of the prices of goods, wages, and contracts generally would occur. When these had settled down upon the new basis, the mischief would cease; but, in the meantime, the inconvenience alluded to would have occurred, and much discontent might justly be felt.

These are comparatively small matters, but evils of this kind would be very extensively felt by the manufacturing population. All the piece work of the factory is adjusted at prices fixed, in many cases, after long struggles and obstinate strikes, and always expressed in terms of the penny. The man who had been working at a penny a yard would perhaps expect to receive five mils; the employer might insist on four mils, as the nearest equivalent; and it would be long before such a universal derangement of the relations between masters and men could settle down on a fair and satisfactory footing.

A more formidable matter to deal with would be the fixed rates, fares, and tolls which supply the profits of so many important commercial undertakings. All these would require readjustment under circumstances which would make an equitable settlement very difficult. Take the case of a railway company charging the full rates of tonnage allowed by law, which we may suppose to be fixed at such sums as $\frac{1}{4}d.$, $\frac{1}{2}d.$, $1d.$, $2d.$, and so on, per mile. Unless they were to embarrass their dealings by still making their charges and keeping their accounts on the old footing, they must sacrifice 4 per cent. of gross income, which, in many cases would swallow up the whole of the dividend on the ordinary shares.

Every canal, turnpike trust, and toll-bridge, would be affected in a still more serious way, and in such cases the difficulty could not be evaded even by the concurrent use of the old denominations for purposes of account. Some sort of compromise would have to be effected by legislation to meet all such cases, and it would be impossible to make the adjustment without doing some wrong, either to the particular companies and other bodies interested in such rates or tolls, or else to the public who dealt with them.

Similar difficulties would occur in the Revenue departments of the Government, and in adjusting the pay of the army and navy. Wherever any Stamp, Excise, or Customs duty is now fixed at $1d.$, either four or five mils must be taken as a substitute. The large increase would not be very willingly submitted to, and the Government must either bear the considerable loss of four per cent. on every penny duty, and a somewhat smaller proportion on other sums, or else the tariff must be remodelled throughout. On the former alternative, the annual loss which would ensue in the Inland Revenue alone is estimated by the Comptroller-General at 250,000*l.* The loss in the Customs would probably not be less, and in the Post-office it would be nearly 4 per cent., of the gross receipts, or at least 100,000*l.* Besides the loss of revenue, an additional inconvenience

App. II., p. 24, Lyne, 988.

of a serious kind would be felt if a charge of four mils were substituted for the present penny postage, and other penny duties. Such an arrangement would make a four-mil piece indispensable; and as a five-mil piece would also be one of the new coins, perpetual confusion between two coins so nearly equal in value would be the probable consequence. Some of these objections might be obviated by raising the postage rate to five mils, and making a revision of the whole Customs and Excise duties; but the necessity of such sweeping and impolitic changes must be reckoned among the inevitable inconveniences of introducing a decimal system not commensurable with our present copper coins.

The corresponding difficulty with the army and navy could scarcely be got over without a considerable permanent addition to the expenses of those services. Any reduction in the pay of the soldier or sailor to accommodate other classes who may desire a decimal coinage, would probably not be thought of; and the only way in which the present rates of daily pay could be replaced under the new system, would be by treating an odd penny as equal to five mils. The soldier's 13*d.* would become 55 mils, and so on. The total outlay thus occasioned on the whole strength of the land and sea forces, with a similar increase in the wages of dockyard and other labourers, would form a serious addition to the annual estimates, without any return for the expenditure. Indeed, it is obvious that, in case of conflict arising between the Government and those whom it employs, the loss occasioned by the alteration of the coinage could not be allowed to fall on the latter; and although the difficulty thus resolves itself into a mere question of money, a permanent annual burden of considerable amount is a matter which should weigh something against the benefits, whatever they may be, of a decimal coinage.

XIX. From the evidence of Mr. Slater, moreover, and still more conspicuously from that of Mr. Julius Page, it appears that the change to a decimal coinage would not only inconvenience the poorer classes, but would seriously derange the course of business connected with foreign exchanges. The quotations of exchange with foreign countries are made sometimes with reference to the pound, but nearly as often with reference to the penny. Thus the exchange on Paris is stated at so many francs and centimes for the pound; that on St. Petersburg, at so many pence for the rouble. If the penny were extirpated, it would be necessary either to establish a new form of quotation, or to quote as before, and encumber every calculation with a subsidiary process of reduction to mils. It may be imagined that an alteration in the mode of quoting exchanges, and a consequent change in the customary course of calculation, would be an easy matter; but experience has shown that, even where an obviously absurd form of quotation has become established, custom prevails over every other consideration, and it is almost impossible to bring the two countries concerned to a common agreement in favour of a simpler system. This difficulty would be still more severely felt, if, for her own exclusive convenience, England were to require half the commercial centres of the world to abandon old habits and settled modes of computation, in order to establish a new form of quotation to suit the new coinage which she desired to introduce. The result, therefore, would probably be, that the old quotations would be long maintained, while, instead of any new facility being gained, the labour of an additional reduction from one notation to another would be entailed on all whose business required them to be conversant with foreign markets. These are the conclusions suggested by the evidence of a witness whose long experience in matters of this description gives the highest authority to his opinion, and they suggest doubts whether even, in the operations of foreign commerce, the projected change would be attended with the anticipated benefit.

App. I., p. 20. Ans. p. 183.

Ans., J. Page. pp. 183–187.

XX. In the introduction of Decimal Coinage in any of the forms which have been proposed, there would be some difficulties and much delay in effecting the necessary changes in the coins in circulation. These would be less in the case of the pound and mil system than in some of the other Decimal Schemes which have been proposed, but still would be considerable. Before the transition period could be brought to an end, it would be necessary to call in and recoin all the copper, and probably some important part of the silver money of the country. The threepenny and fourpenny pieces must be altogether suppressed, while even with regard to the other silver coins it would be desirable for the public convenience that they should be stamped with some mark to signify their relation to the new system. But Mr. Graham, the Master of the Mint, is of opinion that this would be an equally troublesome and less advantageous course than the recoinage of the whole. The estimated number of copper pieces which have been put into circulation is 494 millions, and of silver coins 265 millions. The mere recasting of this enormous mass of coin would be a formidable operation, but Mr. Graham calculates that, by combining the resources of the Government establishment, with assistance from private manufacturers, he might complete the task in three or four years. This, however, would not measure the duration of the tran-

App. II., p. 66. Graham, 1392–1397.

sitional period, unless it be assumed that the legal prohibition of the present copper coinage, after some fixed date, would suffice to stop its circulation, and cause it all to be brought into the Mint to be recoined. Should small traders and their customers continue to accept and pay the old pence and halfpence at their former value, it would be impossible to enforce the change by any penal severities. The number of the copper and silver coins in circulation is not the only important point. The comparative frequency with which the coins pass from hand to hand, must tend greatly to increase the inconvenience which may be anticipated from any measure which forcibly changes the value of these coins in their relation to each other. It has been remarked by Adam Smith (B. ii. chap. 2), that "small sums circulate much faster than larger ones. A shilling changes, masters more frequently than a guinea, and a halfpenny more frequently than a shilling." Probably it would be found necessary to advance by slow and cautious steps, and to indulge for a long time the prepossessions, especially of the poorer classes, in favour of their accustomed coins. In his evidence before the late Parliamentary Committee (532), Sir John Herschel says of the proposal to introduce a Decimal Coinage—"It cannot be expected that it should not present itself to the lower classes under a repulsive aspect; and without allowing a sufficiently long interval for preparation, and duly familiarizing these classes with the expectation of a change, and giving them an idea of what that change will consist in, it will be quite sure to encounter a very formidable resistance." It is not easy to see how the people are to be familiarized with the change, except by the gradual circulation of new coins intermixed with our present money. The confusion which would result from the co-existence of two copper coinages differing 4 per cent. in value, is a serious thing to contemplate; but the only other alternative is to disregard Sir John Herschel's warning, and make a sudden change by law in the value of the existing coins, in lieu of issuing new pieces to represent the new values. The requisite alteration in the legal value of the vast mass of copper coin in the country, and of the smaller silver coins would involve a loss falling on the poorer classes which may be estimated at 50,000*l*. This would be felt as an act of arbitrary injustice by every one who suffered by the change, and there would therefore seem to be no option but to call in the old coins and issue new ones, with such moderate speed as the extent and difficulty of the operation, and the necessity of avoiding harsh measures of compulsion, would allow. Two systems of coin would therefore remain for some indefinite period, circulating side by side, and our coinage would certainly, during all this time, be worse than that which we have at present. No one who has experienced the inconvenience of the concurrent coinages met with in various parts of the Continent would willingly admit the evil, for any considerable time, into this country, even though one of the rival systems should be theoretically perfect. How long this confusion would have to be endured we shall not attempt to predict, but it could scarcely fail to extend over many years.

Recapitulation.

XXI. In conclusion, we will briefly recapitulate the principal considerations for and against the projected change.

In the present state of opinion, the controversy is reduced to the single question, whether the pound and mil system can be advantageously introduced. Without some evidence of the willingness of the commercial and other classes to give up the use of the pound sterling, it would be impossible to recommend the introduction of the decimal principle on any footing inconsistent with the retention of the unit, which is so firmly established in their habits and associations, and so thoroughly interwoven with the fiscal and monetary system of the country. Many weighty reasons have, it is true, been urged for giving a preference to other forms of decimal coinage, more especially to that which is based on the penny; but we have not found, on the part of men of business, such an amount of concurrence in any of these projects as would justify the abolition of their familiar unit, the pound. On the contrary, we have reason to conclude that such a change would be regarded with aversion, not only by those who hold by the present coinage, but by all, except a small proportion, of the advocates of the decimal principle. The question, therefore, resolves itself into the expediency of attempting to introduce the pound and mil coinage—the only possible decimal system in which the pound can find a place as a coin of account.

The arguments in favour of this scheme appeal to foreign experience and scientific authority, as well as to general reasoning. They may be shortly stated as follows:

1. All the foreign countries which have adopted the decimal principle have pronounced it more convenient than their former systems of coinage; while, in some instances, it has

been found to work not inharmoniously with a non-decimal scale of weights and measures, and, in the case of the United States, with one absolutely identical with our own.

2. There is a great preponderance of scientific authority, together with some support from the mercantile classes, in favour of the decimal principle in the particular form of the pound and mil scheme.

3. The decimal principle is recommended by its harmony with the universal system of arithmetic. The adoption of a decimal coinage would greatly simplify mercantile accounts and other arithmetical operations, by banishing compound arithmetic altogether if weights and measures were also readjusted on a decimal basis; and a considerable proportion of this benefit would be secured even if the coinage alone were decimalized, while the rest of the metrical system remained on its present footing.

4. The importance of retaining the pound must determine the choice among different decimal systems in favour of the pound and mil scheme.

The main arguments on the other side are as follows:—

1. The experience of foreign countries must be qualified by the following considerations:—

a. In almost every instance they were driven to a decimal system by the excessive confusion of their former coinage, or by the desire of assimilating their practice to that of important contiguous States; and there is no instance of any decimal system having been preferred to, or even brought into comparison with, a coinage at all approaching in convenience our pounds, shillings, and pence.

b. The decimal coinages now in existence are, without exception, strictly centesimal; that is, they consist practically of two coins only, in the relation of 100 to 1. The franc of 100 centimes, the dollar of 100 cents, the rouble of 100 copecks, the florin of 100 cents, the lira of 100 centisimi, the ducat of 100 grani, the drachma of 100 lepta, the scudo of 100 bajocchi, the ricksdolar of 100 ör, are examples of this universal law; and the case of the United States is eminently suggestive, from the fact that their law actually attempted to found a millesimal system, which was rejected in practice in favour of the simpler relation of one dollar to 100 cents. An analogous simplification could only be applied to the pound and mil coinage on the inadmissible supposition that a cent of about $2\frac{1}{2}d.$ in value would be small enough to serve as the lowest unit of the decimal scale.

2. Although the weight of scientific authority may be in favour of the project, it is by no means unanimously so; while the judgment of practical men of business is generally adverse to the experiment.

3. The advantages of the decimal scheme would be confined to accounts and paper calculation, and may, besides, be secured without any change in the coinage by all who choose to acquire the very easy art of reducing money to decimals by a process of inspection and memory.

4. The ready divisibility of the numbers 4, 12, and 20, especially by binary factors, renders the present coinage more suitable for mental arithmetic, and for the processes of paying and receiving, and more in harmony with the natural mode of dividing material quantities, and with the existing scales of weights and measures, than any decimal system. The projected coinage would, therefore, be less advantageous than the present for the daily operations of retail traffic, which, when their frequency is taken into account, must be considered as the most important functions of the coinage.

5. The pound and mil system would furnish no minimum coin for commercial purposes at all comparable in convenience to the penny, the cent of about $2\frac{1}{2}d.$ being too large, and the mil as much too small, while the choice of the half-cent would involve the use of a column in mercantile accounts similar to the farthings column, which has fallen into disuse from its inconvenience. Thus all the processes of calling over and copying, which occur more frequently in account-keeping than actual calculations, would be impeded by the use of an additional column, and a consequent increase in the number of figures required.

6. In addition to these permanent inconveniences, the change would be attended by transitional evils geater than have ever been successfully encountered. The suitableness of the present coinage for huckstering traffic would increase the tenacity with which the poor especially would cling to it; the impossibility of finding equivalents for the present money in the new coinage, besides causing much temporary injustice, great difficulty in adjusting fixed rates and tolls, and considerable derangement of commercial business, would necessitate a revision of the Post Office, of the Customs and Excise, of the whole fiscal system so far as it depends on penny stamps, and of the pay of the army and navy, leading inevitably to a large increase in the annual expenditure of the country.

XXII. Giving due weight to these considerations, it is impossible to avoid the conclusion that the establishment of the pound and mil coinage would not be an unmixed benefit, and that the expediency of the experiment must depend on the balance to be struck between the conveniences and the inconveniences which would result from the change.

The superiority of a decimal coinage ought to be quite certain and very considerable to justify us in recommending a change, which would be attended by the serious transitional difficulties to which we have referred. We can discover no such marked superiority. On the contrary, the most anxious consideration which we have been able to give to the subject has failed to satisfy us that the projected coinage would exhibit any balance of convenience at all over that which we now employ.

One practical question remains to be considered—Should the issues of the florin be continued, or ought that coin to be withdrawn from circulation?

The florin was originally struck as an experimental step to facilitate the introduction of the pound and mil system, if that form of coinage should be ultimately approved. Except with that view, there appears to be no advantage obtained by the circulation of such a coin sufficient to counterbalance the inconvenience of its close approximation in size and in value to the half-crown. Both should not, we think, remain as permanent elements of our coinage; and when once it is definitively settled that the pound and mil project is too dangerous an experiment to be ventured on, there can be no doubt that the half-crown is to be preferred, as the more convenient of the two coins. As the first step to the introduction of the decimal principle, and as part of the general scheme, the florin in its present shape is objectionable. The value of the decimal principle for practical purposes consists in the facilities it gives for treating every coin rather as a multiple of some lower denomination than as a fraction of a higher unit. To be consistent with this leading idea, the florin ought to bear upon its face the number of cents or mils which it represents, instead of being stamped with the inscription, "one-tenth of a pound," which is impressed on the present issue.

Whatever view may be entertained as to the course to be ultimately pursued, we think the florin ought to be recalled. If our recommendations are to be adopted, we shall fall back upon the old half-crown; if, on the other hand, the idea of a decimal coinage should not yet be abandoned, a new florin might be issued more in harmony with the decimal principle in its working shape, than the coin now in circulation. The fractional character given to the florin is an example of the inexpediency of taking a partial step towards the introduction of a great change without having previously formed a clear and comprehensive idea of the true character of the proposal, and of the form which the experiment ought to assume. It tends to present a decimal coinage in its most inconvenient and indefensible shape, as a system of decimal division of the pound instead of decimal aggregation of some minimum unit. The one idea appeals to a presumed familiarity with decimal fractions, which the mass of the people cannot be supposed to possess; the other asks nothing more than an acquaintance with the processes of simple arithmetic.

The error, as we conceive it to be, which has thus been committed, ought to warn us against taking any further step without a thorough examination of the bearings of the whole question. A decimal coinage is one element of a complete decimal system, in the same sense in which the florin is one element in a decimal coinage; and to decide in favour of a change in the coinage without first determining what would be the best course to take with reference to other parts of the metrical system, would be to fall into the same mistake, in a far more serious and important shape, that was committed in issuing florins in their present form, before any final adjudication on the general question of decimal coins.

Any precipitate decision on an isolated part of what is really one great question, is the more earnestly to be deprecated because a change once introduced into the coinage will be irrevocable, and ought not to be hazarded until every consideration bearing upon the question has been fully entered into. When we consider the intimate relation between weights and measures and coins—that is, between the instruments by means of which commodities are divided and distributed, and the instruments by which the commodities so divided are paid for—it seems scarcely credible that a proposition can be seriously made to introduce, at the cost of much temporary inconvenience, a new system of coinage, without reference to the nature or principle of that simplification of our weights and measures which the anomalies of the present system appear to render indispensable.

We have scales of weights and measures containing a strong infusion of binary and duodecimal factors, but with a considerable admixture of other modes of progression, which have little or nothing to recommend them. It would be an obvious improvement to reduce this system to some harmonious form; and the first question which would present itself would be whether the decimal, the duodecimal or the binary law of progression ought to be preferred. The conclusion arrived at on this point could not fail materially to affect the expediency of altering our coinage, and the direction which the change should take. If the number 10 should be selected, after due inquiry, as the base of the general metrical system, the question of the coinage would be greatly simplified, and no harm would result from its having been postponed; whereas if a duodecimal or binary system of weights and measures were found to be the best, the previous introduction of decimals into the coinage might be a fatal bar to any satisfactory adjustment of the entire metrical system.

A further advantage of such an extended inquiry as we have suggested would be, that it might direct attention to the debateable question as to the comparative merits of the penny or halfpenny, and the pound and mil schemes, which, under existing circumstances, we have found it impossible to entertain. It would at the same time afford an opportunity for considering the feasibility of a comprehensive project which has been suggested for rendering the whole system of coins, weights, and measures, more strictly duodecimal than it is at present.

For these reasons, therefore, we think that if any further inquiry into the expediency of a change in our present coinage is contemplated, the investigation should embrace the whole subject, including both the scheme of introducing the decimal principle into the entire metrical system, and that of making a similar change on the basis of the number twelve. After a thorough and comprehensive examination—after every project has been completely sifted—it may be hoped that the controversy which has now been so long pending will be finally set at rest by a generally accepted decision either in favour of our present system, or of some one or other of the modifications which have been suggested.

When once the general character of the changes to be introduced had been determined it would be comparatively easy to decide whether the whole should be undertaken at once, or whether one alteration might not be made to pave the way for another. To take one step at a time may be as prudent as a rule of action as it is rash and unphilosophical as a method of inquiry; and though we are impressed with the danger of coming to any partial conclusion without a complete examination of the whole question, no such objection would lie to the gradual execution of successive portions of a comprehensive scheme, after the general direction which our steps should take had been conclusively determined.

In referring to matters which lie beyond the immediate scope of our commission, we would be understood to have intimated no opinion as to what the result of further investigation might be. Not only are we not called upon by the terms of our commission to pronounce any judgment on these topics, but we have not sufficient materials before us to enable us safely to do so. The only opinion which we desire to express is, that under existing circumstances, while our weights and measures remain as at present, and so long as the principle on which their simplification ought to be founded is undetermined, we do not consider it advisable to introduce the decimal principle into the coinage alone.

OVERSTONE.

ANALYSIS

OF THE

ANSWERS TO LORD OVERSTONE'S QUESTIONS,

SO FAR AS THEY RELATE TO THE SUBJECT OF

MENTAL ARITHMETIC;

WITH OBSERVATIONS, BY G. W. HEMMING, M.A., BARRISTER-AT-LAW,
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[Prepared at the request of Lord Overstone to accompany his Draft Report.]

I.—*Answers of Witnesses who advocate Decimalization.*

THE remarks and examples given by these witnssses will be found generally open to the two following observations:—

1. Examples are selected especially favourable to decimals. The shillings are nearly always greater than 10 (17 is a very common choice); in the pence, the numbers 4, 6, 8, which are most readily handled as fractions of the shilling, are carefully avoided, and odd farthings are very frequently introduced.

2. The modes of working used to exhibit the alleged defects of the present system are almost always those fitted for paper arithmetic, and rarely ever the easiest methods of mental arithmetic, which are of a very different kind. This may arise in some instances from the fact that the writers were thinking only of accounts, and forgetful of the greater importance of mental arithmetic; but in others, perhaps from a disposition to ignore the short-cuts by which common calculations over the counter are worked, and unduly to depreciate the present coinage.

These observations will recur to the mind of the reader as I go through the various replies bearing on the subject of mental reckoning.

G. B. AIRY, Astronomer Royal.

G. B. AIRY, Astronomer Royal.

QUESTION.

2. On what grounds does your objection to our present system of coins rest?

ANSWER.	**OBSERVATIONS.**
2. Because the present system is not convenient for calculations, whether the small calculations which are made mentally in the streets or in shops, or the larger calculations which are made on paper.	2. This is an assertion on high authority—but the value of it must depend on the arguments by which it is supported in other answers.

QUESTION.

3. Do you consider them as defective or inconvenient for any of the purposes of retail transactions—*i.e.*, for paying or receiving? Or is your objection restricted to the inconvenience of our present coinage for the purposes of account keeping and calculation?

ANSWER.	**OBSERVATIONS.**
3. If, in the retail transactions, by "paying or receiving" is meant only "the transfer of coins from one purse to another," all coins are equally convenient. If the words are meant to include "the small calculations which always accompanies that transfer," our coins are inconvenient. For instance, in adding mentally or on paper 1*s.* 9*d.* to 2*s.* 7*d.*, when I have added 9*d.* to 7*d.* and form 16*d.*, I have the trouble of converting the 16*d.* into 1*s.* 4*d.*, which trouble I ought not to have in a well-arranged coinage.	3. The *trouble* of converting 16*d.* into 1*s.* 4*d.*, which Mr. Airy treats as something material, will scarcely be thought appreciable by most persons.

In the account-keeping, &c., the objections are still stronger.

QUESTION.

9. In an old but very remarkable treatise on "Coin and Coinage," (Vaughan, 1675,) this passage occurs:—

"Of all the numbers, 12 is the most proper for money, being the most clear from fractions and confusion of account, which ought not to be neglected, by reason that of all other numbers it is most divisible—being divisible into units, as all numbers are; into two parts, as no odd number is; into three parts, as no even number is but six, and the numbers that consist of sixes; into fourths, into which six is not divisible; and into sixths."

In the Memoir dictated by Napoleon at St. Helena, on the new French system, is this passage:—

"On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux facteurs 2 et 5, et que 12 en a quatre, savoir, 2, 3, 4, et 6. Il est vrai que la numération décimale, généralisée et exclusivement adaptée au mètre comme u nité, donne des facilités aux astronomes et aux calculateurs; mais ces avantages sont loin de compenser l'inconvénient de rendre la pensée plus difficile. Le premier caractère de toute méthode doit être d'aider la conception et l'imagination, faciliter la mémoire, et donner plus de puissance à la pensée."

What validity is there in these considerations as objections to the introduction of a decimal system of coinage? Or in what does the fallacy of them consist?

G. B. Airy, Astronomer Royal.

ANSWER.

9. First, I may remark that, in the course of my life, to the best of my recollection, I have never had occasion to divide by 3, 6, or 9, and rarely by 12; and in any case the treatment would come under the following sentence, viz.:—

Secondly, if I have occasion to divide 27*l.* 17*s.* 9*d.* by 4, I am in no degree benefited by the circumstance that 20 and 12 are divisible by 4. I say 4 goes 6 times in 27, with 3 remainder; I turn the three into shillings, and then I say, 4 goes 19 times in 77, with 1 remainder; I turn the 1 into pence, and then I say, 4 goes 5 times in 21, with 1 remainder; I turn the 1 into farthings, and here (where it is unimportant) I have a divisible number.

The fallacy in the remarks cited consists in the assumption that extreme benefit is derived from certain divisibilities, which practically is not so derived.

OBSERVATIONS.

9. The first observation in this answer is only an excessively strong way of stating the fact that binary divisors are of more frequent occurrence than any others. This is true; but the superiority of the present coinage is very conspicuous when tried by binary divisors, as will presently appear.

With respect to the second observation, it is true that you are not benefited by the divisibility of 20 and 12 as the example is worked in the anwer, but you would be so if you reckoned as people do reckon over the counter. The fallacy in the example given consists in making the calculation by the paper method. Mentally, it would be done thus:—

$\frac{1}{4}$ (27*l.* 17*s.* 9*d.*) = $\frac{1}{4}$ (27*l.*) = 6$\frac{3}{4}$*l.* = 6*l.* 15*s.*
+ $\frac{1}{4}$ (17*s.*) = 4$\frac{1}{4}$*s.* = 4*s.* 3*d.*, makes 6*l.* 19*s.* 3*d.*
+ $\frac{1}{4}$ (9*d.*) = 2*d.* + $\frac{1}{4}$ (1*d.*) = 2$\frac{1}{4}$*d.*, makes 6*l.* 19*s.* 5$\frac{1}{4}$*d.*

Here the divisibility of the pound helps us to the result, $\frac{3}{4}$ 1*l.* = 15*s.*; that of the shilling to the result, $\frac{1}{4}$ 1*s.* = 3*d.*; and that of the penny to the result, $\frac{1}{4}$1*d.* = $\frac{1}{4}$. Putting down the steps at which an ordinary computer would rest, the process is—

£ *s.* *d.* £ *s.* *s.* *s.* *d.* £ *s.* *d.* *d.* *d.* £ *s.* *d.*
$\frac{1}{4}$ (27 17 9) = 6 15, and $\frac{1}{4}$ (17) = 4 3, makes 6 19 3; and $\frac{1}{4}$ 9 = 2$\frac{1}{4}$, makes 6 19 5$\frac{1}{4}$.

Now try the corresponding decimal process.

To find $\frac{1}{4}$ 27*l.* 8*f.* 8*c.* 7*m.*, or $\frac{1}{4}$ 27·887, whichever way it is written. Setting down the steps at which an ordinary computer would rest, the process is—

$\frac{1}{4}$ (27·887) = 6 and carry 3, and $\frac{1}{4}$ 38 = 9 and carry 2, gives 69; and $\frac{1}{4}$ 28 = 7 and carry 0, gives 697, and $\frac{1}{4}$ 7 = 2 —, gives 6972—.

The decimal process is longer than the working by £ *s.* *d.*; but a more serious objection is, that the strain upon the memory during the process is much greater. I will analyse this closely, because the same considerations apply to every or almost every example that can be given.

With the £ *s.* *d.* notation, the figures to be kept in the head from time to time are shown by the following table:—

	Partial results to be remembered.	Sums for present and future operations to be remembered.
At commencement	—	27*l.* 17*s.* 9*d.*
After getting $\frac{1}{4}$ 27*l.* = 6*l.* 15*s.*	6*l.* 15*s.*	17*s.* 9*d.*
After getting $\frac{1}{4}$ 17*s.* = 4*s.* 3*d.* and adding	6*l.* 19*s.* 3*d.*	9*d.*
After getting $\frac{1}{4}$ 9*d.* = 2$\frac{1}{4}$*d.* and adding	6*l.* 19*s.* 5$\frac{1}{4}$*d.*	—

With the decimal notation, the corresponding table would be as follows:—

	Partial results to be remembered.	Sums for present and future operations to be remembered.
At commencement	—	27·887
After getting $\frac{1}{4}$(27) = 6 and 3 over	6	38 and 87 (or 3 and 887)
After getting $\frac{1}{4}$ (38) = 9 and 2 over and adding the 9 to the 6	69	28 and 7 (or 2 and 87)
After getting $\frac{1}{4}$ (28) = 7 and adding	697	7 and 7 (or 0 and 7)
After getting $\frac{1}{4}$ 7 = 2 and adding	6972	—

The contrast is very great. On the two systems we have to remember—

	Present system.	Decimal system.
At the first stage	The proposed sum = 1	The proposed sum = 1
After first operation	One result and one sum to be dealt with = 2	One result and two sums to be dealt with = 3
After second operation	One result and one sum to be dealt with = 2	One result and two sums to be dealt with = 3
After third operation	One result = 1	One result and one sum to be dealt with = 2
After fourth operation		One result = 1
Total	Six efforts of memory, max. at one time = 2	Ten efforts of memory, max. at one time = 3

If the final result were put out of consideration, the comparative number of efforts would be as 5 to 9. Moreover, with the exception of one partial result to be mentally recorded at each step, the sums to be remembered on the £ *s.* *d.* system are merely the undisposed-of residues of the originally proposed sum, which is already fixed in the memory; while on the "divide and carry" system of working, which I have used for the decimal reckoning, there is, in addition, at each step, an entirely fresh number to be recorded and worked with. In the above comparison, I have said nothing of the little effort of mind necessary to determine the place of the decimal point; but this is not altogether to be forgotten.

Now it may be urged in reply, that the same method which I have used for £ *s.* *d.* might be employed also with the decimal coinage. This is true, but it could not be used nearly so readily; and if it were used generally, the inferiority of decimals for mental reckoning must be admitted. Indeed, so little does it occur to the advocates of a decimal coinage to adopt this plan, that Mr. Airy and others take the opposite course, and insist in working £ *s.* *d.* sums by the clumsy book process.

G. B. Airy, Astronomer Royal.

The argument, not only on this but on every common example, stands thus :—

There are two modes of calculation—one the "put down and carry" method of the books, which for distinction I will call the paper method ; the other an essentially different method, the general principle of which is to deal finally with one denomination before going to a lower, to treat the lower denominations as far as possible as fractions of the higher, and to have no "carrying" at all, or at least to use it only as an occasional expedient. This I may call, *par excellence*, the head method. It is possible that, in some rare cases, the paper method might surpass the head method, even for mental reckoning ; but as an almost if not quite universal proposition, it may be said, with reference to our present coinage, that, for mental reckoning, what I have called the head method is much easier than the paper method. Now if this is admitted, as it must be, the whole argument is very short.

1. It is conceded that the paper method with decimals is easier than the paper method with £ *s. d.*

2. The head method with £ *s. d.* is easier than the head method with decimals. The reason is, that this method abandons all the advantages peculiar to decimals, for the sake of the advantage of a fractional mode of handling, which depends on the divisibility of 20, 12, and 4, and can only be imperfectly gained with a decimal notation.

Consequently, if decimals are generally superior to £ *s. d.* for shop traffic, it can only be because the paper method with a decimal coinage is superior to the head method with £ *s. d.*, even for mental reckoning.

There is no occasion, therefore, to test any decimal sums by using the head method, because on that system decimals must be beaten in the very great majority of cases. Neither is it necessary for my purpose to work £ *s. d.* sums by the paper method, because I admit that, in the great majority of cases, decimals will beat £ *s. d.* when so handled. The real question to be put in each case is this :—

Is mental work by the paper method with decimals, or by the head method with £ *s. d.*, the easier on the average of all cases of common occurrence ? I think the working above given of Mr. Airy's selected example shows the advantage to be in this instance in favour of the present coinage.

The foregoing observations—especially those relating to the comparative stress on the memory, *which is the only real difficulty in mental calculation*—will be true of almost every example which I shall have to consider ; and I shall leave the reader to apply them himself, without wearying him by perpetual repetition. I now proceed with the analysis of Mr. Airy's paper.

QUESTION.

17. Commodities are divided for the retail purposes of the market by means of our weights and measures, and the practical purpose of coins is to effect the payment for those retail purchases. Can the adjustment of our system of coinage be properly disconnected from the adjustment of our system of weights and measures ?

ANSWER.

17. Certainly the adjustment of coinage can be properly disconnected from the adjustment of weights and measures, as will be seen on trying any case. If an avoirdupois pound of any commodity costs 4*l.* 17*s.* 10*d.*, what will an avoirdupois ounce cost ? Now, without waiting for any change of the avoirdupois scale, all that I want to know is, how I can most easily divide 4*l.* 17*s.* 10*d.* by 16 ? And I assert, as a thing which nobody can doubt who tries, that this is much the easier on the decimal scale of money ; and therefore the introduction of the decimal scale of money is advantageous, without modification of weights and measures.

OBSERVATIONS.

17. The example proposed is to divide 4*l.* 17*s.* 10*d.* by 16 ; and Mr. Airy asserts, as a thing which nobody who tries can doubt, that this is much the easier on the decimal scale. I do not know whether the assertion is meant to refer to mental work ; but let us try what the fact is in such case.

With £ *s. d.*, the process is as follows :—

$\frac{1}{16}$ (£4 17 10) is 5*s.*, and $\frac{1}{16}$ (16) = 1*s.* make 6*s.*, and $\frac{1}{16}$ (1*s.* 4*d.*) = 1*d.* make 6*s.* 1*d.*, and $\frac{1}{16}$ (6*d.*) = $\frac{3}{8}$*d.* make 6*s.* 1$\frac{1}{4}$*d.* +.

With decimals we should have :—

$\frac{1}{16}$ (4·892) is 3, and $\frac{1}{16}$ (9) = 0 and carry 9 makes 30, and $\frac{1}{16}$ (92) = 5 and carry 12 makes 305, and $\frac{1}{16}$ (12) = $\frac{3}{4}$ makes 305$\frac{3}{4}$ = 305·75 or 306—

Both the strain on the memory and the difficulty of each division by 16 are incomparably greater than before ; yet this is a *lucky* or *judiciously chosen* example for decimals, since 48 happens to be exactly divisible by 16. Possibly a decimalist would proceed mentally by two divisions by 4 ; but he would then punish his memory still more severely, and increase the length of the work.

QUESTION.

20. Take the case of an article now selling at a shilling per pound or per yard, and retailed in halves, quarters, ounces, or inches : these fractional quantities are easily and readily paid for in our present coins. But if our coinage be subjected to the decimal principle of division, will not that facility be lost ?

ANSWER.

20. At 1*s.* per pound the statement is correct ; at 1*s.* 5$\frac{1}{2}$*d.* it is not correct.

OBSERVATIONS.

20. The example suggested by this answer is to find any number of halves, quarters, 16ths, and 96ths of 1*s.* 5$\frac{1}{2}$*d.* ; a price chosen by Mr. Airy as a peculiarly difficult one to treat on the present system.

Now the half and quarter may be set down almost without calculation, as—

9*d.* — $\frac{1}{4}$ or 8$\frac{3}{4}$*d.* and 4$\frac{1}{2}$*d.* — $\frac{1}{4}$ ($\frac{1}{2}$*d.*) = 4$\frac{1}{2}$*d.* —

$\frac{1}{16}$ in the same way is 1*d.* + $\frac{1}{16}$ (1$\frac{1}{2}$*d.*) = 1*d.* +

$\frac{3}{16}$ gives $\frac{3}{16}$ (1*s.* 4*d.*), or 3*d.* + $\frac{3}{16}$ (1$\frac{1}{2}$*d.*), or $\frac{3}{8}$ farthing = 3$\frac{1}{4}$*d.* +.

Again, $\frac{1}{96}$ (1*s.* 5$\frac{1}{2}$*d.*) = $\frac{1}{96}$ (1*s.* 6*d.*), or $\frac{1}{2}$*d.* — $\frac{1}{96}$ ($\frac{1}{2}$*d.*) = $\frac{1}{2}$*d.* —

Now, decimally, the equivalent value is 73 mils nearly, and the half and quarter (of 73 mils) are not quite so obvious as before, but still readily enough put down as 36·5 and 18·75, or 36 + and 19—So also, remembering that 16 = $\frac{1}{4}$ (64), we get $\frac{1}{16}$ (73) is 4 + $\frac{9}{16}$ . . . . = 4 +.

$\frac{3}{16}$ (73) would either be got by two operations, or else by the following plan, dependent on the recollection that 4 × 16 = 64.

$\frac{3}{16}$ (73) = $\frac{3}{16}$ (64), or 12 + $\frac{3}{16}$ 9, or 1$\frac{11}{16}$, &c. = 13 + or 14—

$\frac{1}{96}$ (73) comes out as 2 + about as readily as we obtained the halfpenny before.

This is the example chosen by Mr. Airy as a set-off against the admitted superiority of the present coinage, when the price dealt with is a shilling.

Even here the advantage is somewhat in favour of £ *s. d.*

QUESTION.

33. The Select Committee of Parliament of 1821 recommended that the subdivision of weights and measures employed in this country be retained, as being far better adapted to common practical purposes than the decimal scale. If this recommendation be founded on sound reason, is it not equally applicable to the case of coinage as it is to weights and measures? Is it not fully as true of coins as it is of weights and measures, that the present subdivision of them is well adapted to all common practical purposes?

G. B. Airy, Astronomer Royal.

ANSWER.

33. The advantage of the existing subdivisions of weights and measures in this country is great, so long as, when mixed denominations are used, they are not subject to the processes of long addition, multiplication, or division. When these come in, the existing subdivisions are excessively inconvenient, and all who use them have been compelled to abandon them and resort to the decimal scale. Thus—

The Civil Engineers, one and all, have long since abandoned the use of inches on the levelling staves, and have adopted decimal parts of the foot.

The Bank of England, the Royal Mint, and bullion dealers generally, have abandoned the pennyweight and grain, and have adopted decimal parts of the troy ounce.

Her Majesty's officers of Customs have abandoned the avoirdupois ounce and dram, and have adopted decimal parts of the avoirdupois pound.

Coins require the decimal division even more imperatively, because they are more frequently treated in long addition, multiplication, and division.

OBSERVATIONS.

33. Observe that the inconvenience complained of in this answer is only in long processes which are necessarily worked on paper, and that the inferiority of decimal weights and measures (and, by inference, of coins also) is admitted in all other cases. I pass over the examples referred to, as they relate exclusively to paper calculations; but it may be observed that, in the Customs, calculation with the duodecimal scale is used for the measurement of timber.

QUESTION.

36. In the Report of the Legislative Assembly of Canada, on Decimal Currency (p. 14), is the following statement:—

"The decimal currency admits of but one aliquot division—into halves—but the New York shilling, an eighth of a dollar, can be divided into sixths, quarters, thirds, halves, &c.; and although Congress has never coined any shillings, the American people during sixty years have clung to their well-worn shillings and sixpences, perceiving them to be a great public convenience. Your committee are of opinion that coins representing the eighth and sixteenth of a dollar are indispensable in small transactions in Canada, and that the smooth British sixpences will continue to pass extensively as the eighth of a dollar, unless a better coinage is provided."

In a communication from the Rev. Joshua Leavitt, of New York (p. 48 of the same Report), this further remark occurs:—

"I have no doubt of the superiority of the decimal system for the purposes of accounts, and am astonished that other countries have so long delayed its adoption. Our experience of the benefit of our federal currency in this respect is all one way. The saving of time and labour is prodigious, and the advantage in point of correctness and of the facility of detecting errors unquestionable. But for the purposes of small circulation, in marketing, huckstering, and the like, I am persuaded that a duodecimal currency like that of England, or like that which formerly prevailed in the city of New York, is far preferable. These small transactions of daily life outnumber the transactions of commerce almost infinitely. And it seems impossible to make a decimal currency as convenient in these as the old currency. One reason is, that the decimal currency admits of only one aliquot division—that is, into halves. The shilling can be divided into halves, quarters, thirds, sixths, and twelfths; and if it were needed, a coin of the value of two-thirds of a shilling would be found manageable. In all these countless small transactions which I have referred to, and in which every man is employed many times every day, this capability of subdivision is of great convenience. We are constantly buying a half of a thing, or a quarter, the eighth, the one third, and so on. If the price is a dollar, we can make the change for one half, for one quarter, and if one, two, or more pence, with our decimal currency; but we cannot pay the exact price of one third, one sixth, one eighth, one twelfth, or any other of the fractional parts. If the price is half a dollar, we can only pay for one half, one fifth, and one tenth. If the price is a quarter of a dollar, we can pay for no aliquot division whatever. This is a constant inconvenience, and can be got along with in no other way than by *disregarding small differences*."

If a decimal coinage be introduced into this country, is there any reason to suppose that the inconveniences here stated as the result of practical experience in the United States will not equally occur in this country?

Will it be possible to obtain the eighth or the sixteenth of a florin, or the quarter of a shilling, or the half of a sixpence, under the proposed decimal system?

If the *small differences* necessarily arising from this imperfect divisibility of the decimal coins must be *disregarded*, upon whom would the unavoidable loss fall?

With the tradesman will it not be an accumulating loss, consuming his profits? and will it not be impossible, therefore, for him to bear it?

Must it not therefore necessarily fall upon the small purchaser?

The principle of the objection is, that the decimal system substitutes the divisors 2 and 5 for the divisors 2, 3, 4, 8, 12, 16, which are the natural divisors for material things, and are also the divisors of our present money, giving us the third, fourth, and half parts of everything.

That the effect of this will be, in the sale of broken parcels of commodities, a small money remainder, involving loss to shopkeeper or customer.

This, we see, is a source of constant inconvenience in the United States.

Let us take the descending steps from 8*s*.

8*s*., or 400 mils, or 4 florins, is not divisible by 32, the divisor of $\frac{1}{2}$ oz.

4*s*., or 200 mils, or 2 florins, is not divisible by 16, the divisor of 1 oz.

2*s*., or 100 mils, or 1 florin, is not divisible by, 8 the divisor of 2 oz.

1*s*., or 50 mils, or $\frac{1}{2}$-florin, is not divisible by 4, the divisor of $\frac{1}{4}$ lb.

6*d*., or 25 mils, is not divisible by 2, the divisor of $\frac{1}{2}$ lb.

In each of these cases, in the purchase of a broken quantity of material, $\frac{1}{2}$ oz., 1 oz., $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., will there not necessarily arise a broken sum of money, which cannot be paid in any coin; a small "difference which must be disregarded," to the loss of buyer or seller?

Mark how under a decimal coinage the difficulty occurs in an earlier stage, and in a more serious form, than under the present coinage, precisely as we descend to the lower amounts, to those which are the usual prevalent prices with the middle and lower classes.

G. B. Airy, Astronomer Royal.

If it be assumed that, instead of these prices, "competition will determine prices in decimals conveniently divisible by 2, 4, 8, or 16," and therefore in prices not corresponding to the decimal money of account; if instead of one shilling, or 50 mils, the price of the unit of the material is taken at 48 mils, is not this in itself an admission that in introducing decimal money we shall have introduced a money not conveniently adapted to the purposes of the market?

And in so doing shall we not have incurred a new set of objections, namely, the inconvenience of being obliged to use several coins with which to pay the 48 mils, instead of one coin with which 50 mils may be paid?

ANSWER.

36. The American experience tells little, for this reason: they had the dollars, and they had the shillings and sixpences, and they easily established a not inconvenient relation between them; and then naturally they disliked the trouble of change. To this is to be added (as I have before said, note on 24,) that the dollar is a bad coin for continued decimal subdivision.

I give no attention to the one third or two thirds.

If the divisions by such numbers as 16 were to be strictly carried out, the existing coinage would frequently be more convenient than the decimal coinage. I imagine that the divisions are not strictly carried out, and that in general a small packet of goods is sold dearer than a large one; and that the decimal coinage would not be inconvenient for this system.

OBSERVATIONS.

36. Here Mr. Airy candidly admits the advantages which are peculiar to the present coinage, and states fairly enough that the real contest is as to the balance of conflicting advantages.

One of Mr. Airy's suggested qualifications, viz., that the price of a small quantity, as the oz., is not commonly a proportional part, as $\frac{1}{16}$th of the price of a large one, as a lb., seems to be at variance with the practical experience of Mr. Kirkham and Mr. Strugnell. (See App. I., pp. 165, 166.)

QUESTION.

37. Again: Mr. Leavitt bears testimony to the admirable qualities of the decimal currency for accounts, but asserts that for small circulation and payments in marketing, huckstering, and the like, a duodecimal coinage is also wanted, and preferable to the other. These small transactions of daily life far outnumber the dealings of commerce. And this statement is sanctioned by the concurrence of the Committee of the Legislative Assembly of Canada?

ANSWER.

37. If it were possible, I should be glad to have two concurrent systems of subdivision of the florin (like the binary and decimal subdivision of the avoirdupois pound, &c., mentioned in my note to 33), but I do not think it is possible; and in this war of extermination the question is, which system shall be established, to the absolute exclusion of the other? I prefer to establish the decimal system.

OBSERVATIONS.

37. Another admission, that for marketing business, the decimal coinage would be inferior to our own. The preference given to decimals can only be justified on the assumption that their superiority for paper calculation more than compensates their inferiority for huckstering traffic.

QUESTION.

61. Is it not a serious objection to the proposed scheme that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of everything which they require, and to the use of which they are well accustomed; whilst, on the other hand, it will give them the devisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use?

"A glance of the eye is sufficient to divide material substances into successive halves, fourths, eighths, and sixteenths. A slight attention will give thirds, sixths, and twelfths. But divisions of fifth and tenth parts are among the most difficult that can be performed without the aid of calculation. Among all its conveniences, the decimal division has the great disadvantage of being itself divisible only by the numbers two and five. The duodecimal division, divisable by two, three, four, and six, would offer so many advantages over it, that while the French theory was in contemplation, the question was discussed, whether the reformation of weights and measures should not be extended to the system of arithmetic itself, and whether the number twelve should not be substituted for ten as the term of the periodical return to the unit."—Quincy Adams's *Report*, p. 71.

ANSWER.

61. Omit the 3, and I assent to this.

OBSERVATIONS.

61. Here, again, Mr. Airy admits that it is a serious objection to decimals that they would deprive the lower classes, in many cases of the convenient aliquot divisors which are now readily available.

QUESTION.

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher classes,—those who keep extensive accounts, and enter into large calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multitiples and subdivisions?

ANSWER.

63. The advantage would be experienced by all who buy multiples at a shop, that is, by everybody.

OBSERVATIONS.

63. This answer is an *assertion* that retail transactions would be facilitated by the introduction of decimals. Being only an assertion, it admits of no reply, and is difficult to reconcile with some previous admissions.

QUESTION.

64. In connexion with the foregoing considerations, it has been suggested that a vast majority of the smaller money transactions in a community are not transactions of written account at all; that they arise out of retail purchases made in the market or the shop, the calculations connected with which are necessarily performed in the head, and are not reduced to writing. That for these purposes, namely, adaptation to the existing division of our weights and measures, for distinctness of mental conception and

facility of calculation in the head, our existing coinage is better adapted than a decimal coinage; whilst the supposed superiority of a decimal coinage for purposes of written accounts and calculations is not applicable to such transactions, and would not prove beneficial to the great mass of the people, with whom such transactions are of constant daily occurrence.

G. B. Airy, Astronomer Royal.

How far do these considerations constitute a just ground of objection to the introduction of a decimal coinage? or what reply can be made to them?

ANSWER.

64. I believe that the decimal scale is the superior for these calculations. See an instance, in my evidence before Committee of House of Commons, relating to the price of gas.

OBSERVATIONS.

64. The instance referred to is not a fair test of the two methods. Gas is one of the few things which are sold by decimal measure; but such cases do not occur once for multitudes of sales by lbs. and ozs.

PROFESSOR DE MORGAN.

Professor De Morgan.

QUESTION.

12. Which is the more easy for conception, for recollection, or for addition mentally?

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

Again: we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 357 miles?

The half of 2*s.* 6*d.* is 1*s.* 3*d.*, but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.* 125 mils, &c. &c.?

Take another case. Any number of yards—7, 8, or 9 yards—at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 mils per yard:

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market?

Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person in his head, without pen and ink or pencil, and in the midst of confusion?

But try the same process upon the same sum in decimal notation—namely, as 125 mils. Will the calculation be equally simple and easy?

Now try it in pence—namely, as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy?

Again: Price's Patent Candles are advertised in 12lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally? 12lb. boxes at 5·50 mils each, how much per lb.?

Again:

	s.	*d.*		Pence.		Mils.
1 yard or lb.	= 2	6	=	30	=	124, for more easy calculation than 125 mils.
$\frac{1}{2}$ do.	= 1	3	=	15	=	62
$\frac{1}{3}$ do.	= 0	10	=	10	=	impossible.
$\frac{1}{4}$ do.	= 0	$7\frac{1}{2}$	=	$7\frac{1}{2}$	=	31
$\frac{1}{6}$ do.	= 0	5	=	5	=	impossible.
$\frac{1}{8}$ do.	= 0	$3\frac{3}{4}$	=	$3\frac{3}{4}$	=	impossible.
$\frac{1}{10}$ do.	= 0	3	=	3	=	impossible.
$\frac{1}{12}$ do.	= 0	$2\frac{1}{2}$	=	$2\frac{1}{2}$	=	impossible.
$\frac{1}{15}$ do.	= 0	2	=	2	=	impossible.
$\frac{1}{24}$ do.	= 0	$1\frac{1}{2}$	=	$1\frac{1}{2}$	=	impossible.
$\frac{1}{30}$ do.	= 0	1	=	1	=	impossible.

Now, consider the comparative convenience in making the necessary payments.

2*s.* 6*d.* is paid with one coin. How many coins will be required to pay 124 mils?

1*s.* 3*d.* is paid with two coins. How many coins will be required to pay 62 mils?

Is it not by cases of this kind that the relative convenience of different systems of coinage must be tested?

ANSWER.

12. In the additions proposed there are two distinct points of unfairness.

First the easy case of one system should have been joined with an easy case of the other. Shillings and threepences rank, as to facility, with florins and cents. It is no answer to say, that the second addition is a translation of the first: the easy cases of one system do not translate into the easy cases of the other. I should think it very unfair to propose the following as a recommendation of the pound and mil system:—Which is more easy for conception, for recollection, or for addition mentally—

fl.	ct.		*s.*	*d.*
7	8		15	$7\frac{1}{4}$
3	1		6	$2\frac{1}{2}$
1	9		3	$9\frac{3}{4}$
0	3		0	$7\frac{1}{4}$
£1	3	1	£1	6 $2\frac{3}{4}$

OBSERVATIONS.

12. This answer, so far as it points out that the example in the question is a picked one, is correct. The counter example given is certainly not less partial (as is admitted), but it shows for mental work only a very slight superiority in decimals—just so much as arises from the careful omission of mils and insertion of farthings, and no more. The truth is, addition to the extent to which it occurs in mental reckonings is almost equally easy on any system. What difference there is, arises chiefly from the fact that the smallness of the mil renders it necessary to handle larger numbers, and is, therefore, in favour of £ *s. d.* Most persons will, I think, agree with the following observation of Professor Kelland's:—"It is surely easier to add together 3*s.* 9*d.* and 5*s.* 6*d.* than 39 and 56 as abstract numbers. But it may be argued that 39 and 56 will be read as 3 cents 9 mils, and 5 cents 6 mils, respectively. Admit this, and you shift the difficulty to another point. Such very small sums as $9\frac{1}{2}$*d.* and

Professor De Morgan

The second point of unfairness is the presentation of the existing system under all its facilities for conception, while the decimal system is treated as nothing but numerical aggregation of its lowest coin. The decimalist divides 78 cents into 7 florins 8 cents; the follower of the existing system wants process and calculation to bring back 7*s.* 9*d.* into 93 pence. The proposer, in adding 7*s.* 6*d.* and 2*s.* 6*d.*, lumps the shillings, and catches the fact that the pence give an odd shilling; but he omits to notice that we do the same with 7*fl.* 3*c.* and 2*fl.* 7*c.* He wants to bind us to 73 and 27, without partition. Again, he will not allow the new shilling to be 5 cents; it must be 50 mils. He asks, Can you do 9 yards at 50 mils a yard, as easily as I do 9 yards at one shilling a yard? We answer, *Not quite.* We might ask, Can you do 9 yards at $2\frac{1}{2}d.$ a yard, as easily as we do 9 yards at one cent a yard? He ought to answer, *Not by a good deal.* Our retort is unfair, but it is quite as fair as the attack.

In the same manner he proposes *dozens*, and forgets that a decimal coinage must introduce the habit of packing by *tens*, unless experience should show that dozens do perfectly well with decimals, in which case the argument drawn from dozens is annihilated.

And further, he choses nothing but *even prices.* He finds out that 2*s.* 6*d.* will divide in many ways, in which 124 and 125 will not. But all who frequent the shops and markets know that, in all matters connected with the daily supplies of the poor, even prices are the exception, and broken prices the rule. The Commission will surely take evidence on this point. They will call the small shopkeepers, and will find out how bread, meat, vegetables, beer, tea, sugar, coffee, milk, pepper, candles, &c. &c., are sold. Or they will read the evidence given to the Committee of the House of Commons, which would satisfy most people on this point. And in one way or the other they will find that even prices belong to things which are seldom broken, but that in all things which are much subdivided the chaffering and cheapening of the market keeps prices continually broken.

Try 2*s.* 3*d.* a pound, or $7\frac{1}{2}d.$ a pound, or even 7*d.* a pound; find all the fractions laid down in the question, and the superiority of common division applied to 112 mils or 29 mils will be apparent; especially in finding the *mil or farthing above* the inexpressible price.

Again, as to the number of coins, selected instances tell either way. It will probably take 3 coins to pay one-eighth of a pound, or 125 mils, now paid in one coin. But it will take only one coin to pay $2\frac{1}{2}d.$, or its nearest equivalent, now paid in three coins.

As to such even prices as do exist, the present system has a tendency to *force them* by its difficulties of calculation. This is injurious to all parties. Any system under which the farthing is brought into greater prominence will benefit the poorer classes by its tendency to keep natural prices, and prevent settlement at the even fourpences. A great deal might be said on this one point.

1*s.* 1*d.*, which can be added without thought in our present system, have to be represented in larger numbers when the units themselves are smaller—viz., in the case before us they must be read as 3 cents 9 mils, and 5 cents 6 mils." Still, mental addition is generally so easy on either plan, that multiplication and division must be the true tests.

The next observation, on the alleged "second point of unfairness," contains a sophism which requires to be noticed. The answer to it is plain, and has in substance been given already (Airy, Ans. 9). "The decimal notation is treated as a mere aggregation of the lowest coin," because this treatment is its only chance. The sole advantage of decimals consists in the facility of such aggregation, and if "the decimalist divides 78 cents into 7 fl. 8 cents," for the purpose of reckoning, he cannot for a moment compete with the anti-decimalist, whose notation is so much better adapted for this mode of treatment, on account of the great divisibility of 12. See *post*, Answer 47, page 58, where Professor de Morgan rightly says, that the peculiar advantage of decimal arithmetic is derived from dealing with fractions as with integers.

The observation as to packing by tens is incorrect. In France they pack gloves by dozens, and packages by dozens are equally prevalent in America. The alternative argument implies, that if dozens are habitually used with a decimal coinage they must be assumed to "do perfectly well," which, if it means anything to the purpose, must mean "as well as they do with our present coinage." But the habit of using dozens with decimal coins at the most proves only that dozens are so convenient that on the whole they are preferable to packages in tens, even with a decimal coinage. It does not prove the really material point, that dozens with decimals are as convenient as dozens with £*s. d.*, and the contrary is palpably the case. It is therefore mere sophistry to argue that the argument from dozens is annihilated.

As to the remarks on the selection of even prices, it is true that even prices are not the rule, though they frequently occur; but broken prieces are not all difficult prices—as, for example, 2*s.* 6*d.*; 1*s.* 4*d.*, or even 1*s.* $11\frac{1}{4}d.$ (a very easy price)—and it is the fact that easy prices are the rule, and difficult broken prices the exception. See on this evidence App. I., pp. 165–166, and further observations below.

The Commission, in fact, has taken evidence on this point, as the answer recommends, and the result is to show that in actual prices the easy cases with the present coinage are much more numerous than they could possibly be with a decimal system. But see further on this point below.

Finally, Professor De Morgan proposes as a severe test to try common division on 2*s.* 3*d.*, and on $7\frac{1}{2}d.$, against their equivalents in mils. These are 112 or 113, which are equally near to 2*s.* 3*d.*, and 31, the equivalent of $7\frac{1}{2}d.$ Let us try how they work.

Take as divisors 2, 3, 4, 5, 8, a fair selection:—

	Common System.		Decimal System.	
	s. d.	*s. d.*	*m.*	*m.*
1.	$\frac{1}{2}$ (2 3)	= 1 $1\frac{1}{2}$	$\frac{1}{2}$ (112)	= 56
2.	$\frac{1}{3}$ (2 3)	= 9	$\frac{1}{3}$ (112)	= 37+
3.	$\frac{1}{4}$ (2 3)	= 6$\frac{3}{4}$ *d.*	$\frac{1}{4}$ (112)	= 28
4.	$\frac{1}{5}$ (2 3)	= 5$\frac{2}{5}$ = 5$\frac{1}{2}$−	$\frac{1}{5}$ (112)	= 22 +
5.	$\frac{1}{8}$ (2 3)	= 3$\frac{3}{8}$ = 3$\frac{1}{4}$+	$\frac{1}{8}$ (112)	= 14

In these trials, the division by 5 is the only one at all favourable to decimals; the rest are more or less decidedly the other way. And observe, if 113 had been used instead of 112, the result would have been still worse for decimals. Again:—

	d.	*d.*	*d.*	*m.*	*m.*
1.	$\frac{1}{2}$	($7\frac{1}{2}$) = 4 −	$\frac{1}{4}$ = $3\frac{3}{4}$	$\frac{1}{2}$ (31) =	15·5
2.	$\frac{1}{3}$	($7\frac{1}{2}$) = 2 +	$\frac{1}{2}$ = $2\frac{1}{2}$	$\frac{1}{3}$ (31) =	10 + $\frac{1}{3}$ = 10 +
3.	$\frac{1}{4}$	($7\frac{1}{2}$) = 2 −	$\frac{1}{8}$ = 2 −	$\frac{1}{4}$ (31) =	7 + $\frac{3}{4}$ = 8 −
4.	$\frac{1}{5}$	($7\frac{1}{2}$) = 1 +	$\frac{1}{2}$ = $1\frac{1}{2}$	$\frac{1}{5}$ (31) =	6 + $\frac{1}{5}$ = 6 +
5.	$\frac{1}{8}$	($7\frac{1}{2}$) = 1 −	$\frac{1}{16}$ = 1 −	$\frac{1}{8}$ (31) =	4 − $\frac{1}{8}$ = 4 −

There is not much to choose in this case between the two systems, and this is an example picked out as one of the worst that could be selected for £ *s. d.*

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But we will try the operation suggested by the question—viz., to double, treble, halve, and divide by three, and add the results :—

	s.	d.		s.	d.			s.	d.
2 (2	3) is	4	6+	3	(2	3)	= 6 9	makes 11	3
			+	½	(2	3)	= 1 1½	makes 12	4½
			+	⅓	(2	3)	= 9	makes 13	1½

Decimally we have—

2 (112)	= 224	+ 3	(112)	= 336	makes 560
		+ ½	(112)	= 56	makes 616
		+ ⅓	(112)	= 37 +	makes 653 +

The decimal process is certainly more difficult in the head, and it would be worse if 113 were used. The results would not be better for decimals if 7½*d.* were tried, as any one may ascertain by doing the work mentally.

Now these are prices avowedly picked out to exhibit the present system in its worst light. How far do they justify the prediction that "the superiority of decimals would be apparent?" Is not the result even here somewhat in favour of the existing coinage?

QUESTION.

13. Is not the construction of coinage necessarily a divisional process? Is it not the metrical subdivision of the integer for fractional payments in connexion with retail transactions?

ANSWER.

13. The power of dividing is an important element in the capabilities of a system of coinage. There are two things to consider—its *difficulty*, and what the proposer calls its *possibility*; that is, possibility of result without fractions over. In *all* systems these impossibilities are and must be excessively frequent, especially in the smallest transactions. But in difficulty, upon the fair average of broken and even sums, the existing system must be much harder than the decimal system.

The practised computer has some helps from what is called *practice*, and from an inverted rule, which is never set down in books of arithmetic, for a reason we shall see. For example—at 13*s.* 9*d.* a pound, how much an ounce and a half? Sixpence is 8*s.*, and 3*d.* is 4*s.*, and 1*s.* 9*d.* is 21*d.*, of which 1*d.* is 16*d.*, say 10*d.*, and ⅙*d.* or 10¼*d.*, and 1½ ounce is 15½*d.* How comes it that this method of dividing by rising to the mark through obvious steps, this inversion of multiplication by practice, is not in the books of arithmetic? Because the writers are well aware that no one will acquire it except by frequent practice *on instances of one kind*, aided by *memory of essential steps* gained by daily repetition, fortified by the confidence which arises from previous knowledge of *something near the answer*. The grocer's man is quick and sure at turning a lump of shillings and pence per pound into per ounce; the waiter at the Greenwich tavern is equally quick and sure at dividing the bill by the number of guests. Let the two change places, and both lose courage, and with it power. The grocer's man knows something about the price from the very look of the goods; the waiter has as near a guess from what he has seen of the table during dinner. Both have some idea what to take. We now see why such rules are called *practice*.

Now, first, though the decimal system yields a somewhat larger crop of impossible divisions upon the *even prices*, it is at no disadvantage, but the contrary, upon the fair average of all prices.

Next, the facility of its *full work* often makes the full work bear comparison as to facility with the short mental process of the existing system, when there is one, which happens oftener in selected cases than in actual business.

Thirdly, all the short rules of the existing system have their counterparts in the decimal system. For instance, division by inversion of practice. Thirteen proverb-scouting guests have dined, and the bill is 16*l.*, and 7*fl.* 9*c.* *Waiter* (*sotto voce*): '1*l.* is 13*l.*, and 2*fl.* is 2*l.* 6*fl.*, and 1*s.* is 13*s.*, and 54*c.*, which is 4*c.*, and 2 over.' (*Aloud.*) 'Gentlemen 1*l.* 3*fl.* a piece is 11 cents more than the bill, and what you please more for the waiter.' The waiter will do this faster than the Commissioners or myself could follow him. Some waiters will remember that

OBSERVATIONS.

13. This answer abounds in bold statements.

Assertion 1.—That on the fair average of broken and even sums, the existing system *must* be harder than the decimal system.

On the contrary, for mental work it must be admitted, even by Professor De Morgan, that the existing system is the easier on the even sums, and we have already found it the easier, not merely with common broken sums, but with the broken sums picked by Mr. Airy and Professor De Morgan.

Assertion 2.—That the full work (which I have called the paper work) of the decimal system will often bear comparison with the short mental work of the other.

This is, no doubt, what the decimalists have to prove not only "often" but "generally;" but assertion is not proof. To test the truth of this assertion is one of the main objects of these observations, and the examples worked throughout will, I think, appear conclusive against it.

Assertion 3.—That a short mental process with the actual coinage presents itself oftener in selected cases than in actual business.

The practical experience of witnesses, speaking from fact and not from theory, directly contradicts this. A sufficient answer is also given by the fact, that a mental process, more or less short, but always superior to the paper method, has been given above in all the examples selected by Professor De Morgan, and will be given in all the others advanced throughout the collection of papers. Still shorter cuts to a result are available in many cases, but I have carefully avoided using exceptional methods, in order to leave no room for the argument used in this answer. The truth is, that the head method, instead of being exceptional, is substantially of universal application with the present coinage. It would be very different with decimals.

Assertion 4.—All the short rules of the existing system have their counterparts in the decimal system.

If this means that the counterparts are equally useful or of equally frequent application, the error is palpable; for these short cuts depend in great measure on the divisibility of the numbers used in the progression of coins, and in this respect the superiority of our system is unquestioned. But take the Professor's own example; an ounce and a half at 13*s.* 9*d.*, or at 687, or 6*fl.* 8*c.* 7*m.*, where is the short-cut corresponding to that which he has given for £ *s. d.*? However, it is not the possibility of the inverted method referred to by Professor De Morgan that is the *main* strength of £ *s. d.* for mental arithmetic, but it is its capability for the ordinary and more generally used method, which I have called the head method. I may add

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13 times 13 is 169, which settles it immediately; these easy cases come in proportionally as often as the easy cases of the common system.

It is much to be wished that the questions had gone into broken prices.

that the reason why neither of the artifices noticed in this answer appears in the books is, that these books almost invariably confine themselves to the rules of paper arithmetic. I know of no good books on mental arithmetic in existence. If there are any such, the method I have worked with will be found in them, inasmuch as it is that which every one uses in actual dealings.

QUESTION.

14. In the following table compare the three systems, the present, the mil, and the penny system. With which does the superiority rest as regards—

1. Number of figures used?
2. Conciseness of expression in words or in writing?
3. Facility of mental conception of the sum stated?
4. Tendency to promote accuracy in copying or calling over?
5. Facility for calculations, especially those which must be made in the head?
6. Interchangeability at equivalent value with the coins now in use?

£	s.	d.		Mils.		Pence.
1	0	0	=	1000	=	240
0	17	8	=	883	=	212
0	15	6	=	775	=	186
0	9	9	=	487	=	117
0	6	3	=	312	=	75
0	5	7	=	279	=	67
0	4	10	=	241	=	58
0	3	8	=	183	=	44
0	2	4	=	112	=	28
0	1	5	=	70	=	17
4	7	0		4342		1044
27 figures.				34 figures.		28 figures.

If we now proceed to subject these total sums to division, which system will be found the most convenient?

4*l.* 7*s.*, divided by 3, 4, 6, and 12, gives the respective sums, 1*l.* 9*s.*, 1*l.* 1*s.* 9*d.*, 14*s.* 6*d.*, 7*s.* 3*d.*

Pence 1044, divided by 3, 4, 6, and 12, gives the respective sums of 348 pence, 261 pence, 174 pence, 87 pence.

But 4342 mils is not divisible without a remainder by any of these divisors.

ANSWER.

14. (5.) As to facility of calculation, look at the very addition proposed. No answer is needed to any one who denies the very great saving of labour which the decimal system affords in all written calculation. As to mental calculation, it will grow as the decimal elements become familiar. It is much to be wished that the questions would come to close quarters on head work *in broken sums of money.* I cannot do it, because the questions must be proposed by the advocates of the existing system. All the presumptions at starting are in favour of the simple system, which reckons by the common reckoning of numbers. If those who wish to keep out *common counting*, and to retain the plan which substitutes 12 for 10, affirm that either written calculation or head work is easier in their system than in the other, it is for them to bring it to trial. Instances chosen by their opponents are liable to be charged with partiality of selection.

OBSERVATIONS.

14. In this answer, it is said that mental arithmetic will grow as the decimal elements become familiar. Are they not familiar now? Are they not the elements of every sum in simple arithmetic? Can any change of coinage increase our familiarity with them? The fact is, the present coinage and the decimal system are *quâ* modes of calculation equally familiar; and the boldness of the assumption that simple arithmetic is an undeveloped science compared with compound arithmetic, is very startling.

Again, why are all the presumptions "in favour of the simple system, which reckons by the common reckoning of numbers?" Why might they not rather be claimed for more divisible 12 over less divisible 10?

Lastly why is the onus of proof on the defenders, rather than the assailants of the existing system? It is usually supposed to be on those who advocate a change. It is no reason for not giving tests that those who give them may be charged with partiality of selection. The way to escape the charge is to give fair examples. But some tests have been proposed by Professor De Morgan, as well as by others, and I am trying the question on the ground selected by himself. I think these examples are enough to show that the superiority is decidedly with the present system.

QUESTION.

19. If the retail transactions of the community originate in a system of weights and measures, by which the hundredweight is divided into 4 quarters, the quarter into 28 pounds, and the pound into 16 ounces; and in which, again, the lineal measure, the yard, is divided into 3 feet, and the foot into 12 inches; will a coinage, founded on the decimal principle of division, afford a greater facility for the adjustment of such retail transactions than the coinage which now exists?

ANSWER.

19. At even prices there is little loss; at broken prices there is great gain. I could have wished that the proposer had dealt in instances of broken transactions; but all his attempts at close quarters are on even money. If a hundredweight cost 91*l.* 11*s.* $7\frac{3}{4}$*d.*, how much does a pound cost? also the same at 91*l.* 5*fl.* 8*c.* 2*m.*? The direct ways of doing this are as follows, in the two systems. I omit fractions in the common system, because the work is usually exceedingly tangled; I insert them in the decimal method, because they are mere play. If any one likes to put on the fractions in the common system, he is welcome to do so; the work is easy enough in the instance chosen.

	£	*s.*	*d.*
4)	91	11	$7\frac{3}{4}$
4)	22	17	11
7)	5	14	$5\frac{3}{4}$
	0	16	$4\frac{1}{4}$

(*a*)

	m.
4)	91·582
4)	22·8955
7)	5·723875
	·817696

(*b*)

8*fl.* 1*c.* 7*m.* $\frac{696}{1000}$ *of a mil.*

In the existing system, 17 *process figures* are written, the answer being wrong by the 112th of a farthing. In the decimal process, 19 process figures are written, the answer being wrong by about the 2500th part of a mil; and the matter would have been more against the existing system, but for the accidental divisibility of 5*l.* 14*s.* $5\frac{3}{4}$*d.* by 7. In the very last question it was stated that the existing systems might be considered as *binary:* surely 7 is not a binary factor. This factor 7 is an awkward thing to deal with in adapting it to our *quarto-duodecimo-vicesimal* coinage. We have to turn 5*l.* 14*s.* into 114 shillings, and divide it by 7 in the head; unless, indeed, we demand subsidiary paper calculations in the common system. It is, however, the fact, that with all but expert hands the common system does demand little *bye-calculations,* of which its advocates take no notice whatever. I have loaded the decimal work with fractions of mils, merely to show how much allowance against itself that system can afford. It would rarely be done thus, except for the precautions taken against a reader who may "lie at the catch," as John Bunyan phrases it.

(*c*)

4)	91·582*m.*
4)	22·896
7)	5·724
	·818

Ans. 8*fl.* 1*c.* 8*m.*
Too much by about $\frac{3}{10}$ of a mil.

OBSERVATIONS.

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19. This answer gives us another example, the choice of which exhibits the writer's partiality to decimals. However, examine the work given by Professor De Morgan, especially the processes described as going through the mind. The fair inference is, that with tablets decimals give the greater facility. But is this so mentally? Take the first stage in the process—viz., the first division by 4—and work it, not exactly as the Professor does it, but in the best mode for mental reckoning. I should describe the mental process in this stage of the sum somewhat as follows:—

With £ *s.* *d.*	To be remembered during the process.
£ *s.* *d.*	£ *s.* *d.* *s.* *d.*
$\frac{1}{4}$ (91 11 $7\frac{3}{4}$)	91 11 $7\frac{3}{4}$
is $\frac{1}{4}$ 91 = 22 $\frac{3}{4}$ = 22*l.* 15*s.*	22 15 0 & 11 $7\frac{3}{4}$
+ $\frac{1}{4}$ 11 = 2 $\frac{3}{4}$ = 2*s.*9*d.* makes 22*l.*17*s.*9*d.*	22 17 9 & $7\frac{3}{4}$
+ $\frac{1}{4}$ $7\frac{3}{4}$ = 2 — makes 22*l.* 17*s.* 11*d.* —.	22 17 11

Decimally.

$\frac{1}{4}$ (91·582)	91·582
is $\frac{1}{4}$ 91 = 22 and carry 3	22 & 3 & 582
+ $\frac{1}{4}$ 35 = 8 makes 228 and carry 3	298 & 3 & 82
+ $\frac{1}{4}$ 38 = 2 makes 2289 and carry 2	22·89 & 2 & 2
+ $\frac{1}{4}$ 22 = 5 makes 22895 and carry 2	22895
= 22895 +	

This strikes me as a fairer representation of the mental working than that given by the Professor; and here, again, with a particularly crabbed example chosen by himself, the balance of convenience is palpably against him. *Let the reader form his judgment, not by glancing at the work as set down on on paper, but by trying the two processes in his head, and let him note the comparative strain on the memory, and he will, I think, be satisfied.*

The comparison of the two other divisions in the example would present results certainly not less favourable to £ *s.* *d.* Professor De Morgan gives the work on the assumption either that paper is to be used (and in that case I do not question his inferences), or that the calculator has a colossal memory, and treats the difficulty of the partial operations as the only test, whereas in all cases *the true criterion of facility in mental arithmetic is the extent to which the memory is left unburdened.* This fact has been too much neglected; but though Professor De Morgan may keep it in the background, I am quite sure that neither he nor any other adept will deny it.

Twelve process figures instead of 17, no *byework,* not a moment's strain upon a head which contains the common multiplication table, work incomparably more easy, and risk of error very much lessened. But I confess that I have not given the easiest way of finding the price of 1 lb. at 91*l.* 11*s.* $7\frac{3}{4}$*d.* per cwt. In producing that easiest way, I give the unkindest cut of all at the quarto-duodecimo-vicesimal hodge-podge. The shortest and best way of proceeding is to render 91*l.* 11*s.* $7\frac{3}{4}$*d.* into florins, cents, and mils (the rule may be learnt once for all in five minutes), giving 91·582, to work as above, and to render ·818 back into 16*s.* $4\frac{1}{2}$*d.* A little more consideration shows that 16*s.* $4\frac{1}{4}$*d.* is nearer. I affirm, and I only wait for instances produced by antagonists to prove it, because instances chosen by myself might be suspected, that the shortest way of dealing with the *common system* is to learn the head-rule for conversion into *decimals,* to transfer the data into *decimals,* to work in *decimals,* and to transfer the *decimal* answer back into the *common system* by the head-rule. *But this is for those who use decimals*; the world at large must learn abstract decimals from concrete coins, not the way to mend their coins from decimals.

I put down all the actual processes which go through the mind in the cases (*a*) and (*c*), which represent the mode of dealing with the nearest farthing of the common system, and the nearest mil of the decimal system.

(*a*)

In 9, 2; in 11, 2; $\frac{3}{4}$ of 1*l.* 15*s.*; in 11, 2; 15 and 2, 17; 3*s.*, 36 and 8, 44, 11. In 22, 5; $\frac{1}{2}$ of 1*l.* 10*s.*; in 17, 4; 10 and 4, 14; 12 and 11, 23, 5; and $\frac{3}{4}$*d.* 5*l.*, 100 and 14, 114; in 11, 1; in 44, 6; 2; 24 and 5, 29; 4; 4 and 3, 7; $\frac{1}{4}$*d.*

(*c*)

In 9, 2; in 11, 2; in 35, 8; in 38, 9; in 22, 6. In 22, 5; in 28, 7; in 9, 2; in 16, 4. In 57, 8; in 12, 1; in 54, 8.

Professor De Morgan.

What I have entered as shadowing out the consequences of the 4, 12, 20 of the common system, is decidedly less than it ought to be. And the difference of trouble and of risk of error cannot be represented by type, any more than the complex variety of routine.

QUESTION.

21. Under our present system,—

			Mils.	Pence.
1 lb.	=	one shilling	50	12
$\frac{1}{2}$ lb.	=	sixpence	25	6
$\frac{1}{4}$ lb.	=	threepence	12·5	3
$\frac{1}{8}$ lb. or 2 ounces	=	three halfpence	6·25	$1\frac{1}{2}$
$\frac{1}{16}$ lb. or 1 ounce	=	three farthings	3·125	$\frac{3}{4}$

In cases of this kind, will the ordinary transactions of the market be carried on under a decimal system with simplicity or convenience comparable to that which is obtained by the present system?

ANSWER.

21. A shilling a pound again! Answer as before. I take this opportunity, in reference to the example given, to make a remark on the methods which would be followed under a decimal system.

Nothing is more common among opponents of decimals than the assertion or implication that the decimalists is *never to use a common fraction.* Now it ought to be known that the decimalist, perfectly alive to the existence of common fractions and to the mode of using them, intends to use them whenever they will be more convenient. He uses $\frac{5}{10}$ of a mil instead of $\frac{1}{2}$, or $\frac{1}{2}$ of a mil instead of $\frac{5}{10}$, as he judges best. He is sworn at Highgate never to use decimal fractions when common fractions are more convenient, unless he likes decimal fractions better, which, in the case supposed, he is wise enough not to do. In written calculation, he will rarely use common fractions, because decimal fractions are easier. In mental calculation, so long as our present weights and measures remain, and longer too if he should see reason, he will use binary or other fractions for the purpose of head calculations in aid of decimals. At a shilling a pound, or 50 mils a pound, he will see that an ounce is 3 mils and $\frac{1}{8}$ of a mil; and with these he will calculate ounces, and will know that the odd mil comes in at half a pound. And if any opponents should urge that he is abandoning the decimal principle, he will reply that the decimal principle, like all other principles, is to be held by only as long as it is convenient. The common run of people, accustomed to know when the turn of the farthing takes place in their present system, will find the odd eighth of a mil easy enough. But it will matter little; for the even shilling is not a common price in things of common consumption.

OBSERVATIONS.

21. In mental calculation, Professor De Morgan here recognizes the superiority of fractional over decimal work, and claims the right to use it even with a decimal coinage. He is quite right in this; but at the same time he must allow that fractions will not fit decimal coins nearly so well as they do the present ones, and that to use them frequently is tantamount to admitting that for head work decimals would be less convenient than £ *s. d.* Opponents will not urge (as he assumes) "that he is abandoning the decimal principle," but they will urge that he is using a mode of calculation which surrenders all the advantages derived from the regularity of decimal progression without securing those which flow from the divisibility of the numbers by which our present coinage marches; in other words, *that every example in which he finds it convenient to work fractionally with decimal coins, must of necessity be an instance in which the £ s. d. working would be more convenient still.* But he is quite right in saying that, as a rule, decimal methods are best for paper; fractional methods for the head; and this is the foundation of all my observations. Sir John Herschel differs so entirely from Professor De Morgan on this point, that he regards the introduction of fractional coins as a tacit abrogation of the decimal system.—Answer 47 (1).

QUESTION.

22. Would a change from our present to a decimal system of notation and of coins secure any advantages in brevity of expression, in facility of stating accounts, in simplicity of form, in speed or accuracy of calculation, or in facility of payments?

ANSWER.

22. *Speed of calculation.*—Suppose we ask how much per cent. is 13*s.* $2\frac{3}{4}$*d.* in the pound—no uncommon kind of question. In the common ways it might be done as follows; but many writers on arithmetic are shy of *practice* in such cases, and work out the full rule of three. While writing these answers, I was at a business meeting, in which a collector's poundage was stated at $3\frac{1}{2}$*d.* One of my colleagues, a clear-headed man at common arithmetic, asked how much per cent. is that? By help of 14 mils, I answered, as soon as the words were out of his mouth, one pound eight shillings nearly. With an instant's hesitation I could have answered, 1*l.* 9*s.* 2*d.*

13*s.* is	13 × 5	or	65*l.*	0*s.*	0*d.* per cent.
2*d.* is	$\frac{1}{6}$ of 5	or		16	8
$\frac{1}{2}$*d.* is	$\frac{1}{4}$	or		4	2
$\frac{1}{4}$*d.* is	$\frac{1}{2}$	or		2	1
			66*l.*	2*s.*	11*d.* per cent.

Or thus:—

4)300
75
12)275
22–11
20)1322
66–2–11

OBSERVATIONS.

22. Here occurs the first example which is really favourable to decimals. It is a question of per centage; and if such calculations were not outnumbered in the ratio of hundreds or thousands to one by the common reckonings of the shop, the illustration would be very important. As it is, it amounts to little.

Professor De Morgan.

The following is the process for those who are trained in the common way :—

1*l.*	13*s.* 2¾*d.*	100*l.*	
12			
960		960) 63500 (66*l.* 2*s.* 11*d.*	
	158	576	
	4		
	635	590	
		576	
		14	
		20	
		280	
		192	
		88	
		12	
		1056	
		960	
		96	
		96	
		0	

The nearest question in decimal money is as follows :—How much per cent. is 6*fl.* 6*c.* 1½*m.* in the pound? Answer, *by inspection*, 66*l.* 1*fl.* 5*c.* per cent.

Is nothing gained in speed here? Again, it is proposed to find the pounds, shillings, and pence in 146923 farthings.

4) 146923

12) 36730–3

20) 3060–10

153*l.* 0*s.* 10¾*d.*

How many pounds, florins, cents, and mils are there in 146923 mils? Answer, *by inspection*, 146*l.* 9*fl.* 2*c.* 3*m.*

QUESTION.

38. Are not the following the primary requirements of a good system of coinage? viz.;—

1st. That the integer should be divisible into the greatest number of clean fractional parts to correspond with the endless variety of retail transactions which they are to be the means of adjusting :

2nd. That these fractional parts should be expressible in the shortest and most simple form of words, and with the smallest number of figures :

3rd. That the coins should be such, both in denomination and relative value, as may pass with the greatest facility, in valuing or summing them up when presented in great numbers :

4th. That they should be such as may afford the greatest facility for mental conception, for recollection, and for the ordinary process of arithmetic which the people are daily called upon to perform mentally in the tumult of the market or shop, and without the opportunity of recording them in writing :

5th. That they should harmonize with the natural tendency of mankind to subdivide commodities for retail purposes by continual halving.

ANSWER.

38. (1.) For adjustment substitute calculation, or, at least, introduce the idea. If division without remainder be *clean*, then I suppose division with remainder over is *dirty*. These words being agreed on, those computations which are clean at a *1s.* a pound become very dirty at 7¼*d.* a pound. We want much easier ways of dealing with the lowest coins : the decimal system supplies this want.

(2.) The common people have little to do with the technicalities of fractional expression ; and if they had, the forms of decimal fractions are more easy, and more easily convertible, than those of common fractions.

OBSERVATIONS.

38. In section 2 of this answer we have the remark—"The common people have little to do with the technicalities of fractional expressions." I do not appreciate the force of the word technicalities in this statement ; but it is nearly true to say that the arithmetic of common people is exclusively fractional, and not decimal. Section 4 of this answer cannot be correct for head work. So far from it, that £ *s. d.* surpass decimals not only on average broken prices, but on the picked broken prices of Mr. Airy, Professor De Morgan, &c.

(3.) This is indeed a primary requirement ; and one great point of the decimal system is the facility of *valuing and summing up* when the coins go by tens, in agreement with the system of numeration.

(4.) The decimal system distances the common system completely on broken prices, and broken prices are the rule of the market.

(5.) The facilities of the decimal system outweighs the advantage of binary division of coins.

These questions are mere repetitions, and I refer on them to all the answers preceding.

QUESTION.

42. If it be admitted that for all ordinary retail transactions, for the purposes generally of paying and receiving, our present coinage is satisfactory, whilst the inconvenience is found to arise when we come to processes of account-keeping and calculation, does it not follow that our present coins ought if possible to be retained without any change, that some decimal system of *recording* the various sums should be introduced,

Professor De Morgan.

and that we should decimalize our *accounts*, retaining our present *coinage* in all respects unchanged?—See No. 37.

ANSWER.

42. It is *not* admitted that our present coinage is satisfactory for paying and receiving, because a very important element of this process is the way of arriving at the knowledge of *what* to pay or receive. The inconvenience is universal: it is not confined to the higher and more elaborate paper-ruling, item-describing and figure-writing process which is called *accounts*. The inconvenience is comparatively greater in what the questions call *adjustments* than in the grander processes which they call *calculations*. The easier the thing ought to be, and might be, the harder, *comparatively*, does the common system make it.

If we decimalize *accounts*, retaining all our *coins* unchanged, we should make our system worse than it is already, if people would use the new system; but they would not.

OBSERVATIONS.

42. This assumes what I have already gone some way towards disproving—viz., that the present coinage is inconvenient for the short mental computations of the shop. See also the quotation from Professor Kelland cited in the Observations, *post*, Herschel, Ans. 8, at page 61.

QUESTION.

45. In addition to this advantage, will not the statement of values by the number of pence contained in them, rather than by the number of farthings or mils, necessarily involve greater conciseness and simplicity of expression, there being only one-fourth the number of pence as compared with the number of farthings in any value?

ANSWER.

45. Both the existing system and the pound and mil system are superior to the penny system in the following points:—

1. They both aid facility of conception by having coin for every money of account. The 4, the 48, the 960, of the lowest coin; the 10, the 100, the 1000, of the lowest coin, are *names* and *tangible things*. The penny system deals in 10, 100, &c., of its lowest coins without names or things. At some distant period, according to its proposers, we are to have tenpenny coins, introduced gradually, to work confusion among the shillings.

2. They both aid *recollection* in the same way, and therefore *mental calculation*, which is common calculation with common memory substituted for paper memory.

3. They both contain the pound and shilling as a matter of distinct conception.

OBSERVATIONS.

45. Professor De Morgan says of the present and pound and mil systems, that "they both aid recollection in the same way, and therefore also mental calculation, which is common calculation with common memory for paper memory." But he omits to state that they aid recollection in very different degrees, and that mental calculation is not common calculation, *i.e.*, not common calculation by paper methods with £ *s. d.*, though it would generally be so with decimals. *The difference is, that the one coinage gives much greater facilities than the other does for the mode of reckoning best calculated to ease the memory.*

QUESTION.

47. The fractions of a penny would be written as fractions, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. Is this a disadvantage? Is it not the case, that practically in all countries, even in those in which the decimal system is most completely carried out, the ultimate subdivision of coins is binary? Is not this shown by the fact that in France, Portugal, &c., the 5-centime piece, and the 5-rei piece are the lowest coins in general use, or generally expressed in accounts? In the United States is not a $\frac{1}{2}$ cent universally expressed instead of 5 mils? What is the inconvenience of writing such values as fractions? Are they not as easily added in this as in a decimal form, and are they not more easily multiplied?

ANSWER.

47. The mere halving of the lowest coin is no disadvantage. It can be done in a decimal system, and it will be done when convenient; nothing proposed in the question is either impossible to decimalists, or repudiated by them. But it is an abiding delusion of the opponent of decimals that he will suppose the decimalist to be under contract never to use a common fraction.

The language of some advocates of decimals is calculated to foster this delusion; their phrases would almost make one think that decimals are upheld as *ethically* right rather than as *technically* convenient. This is always the case in discussion; matters of practice become matters of doctrine on both sides. So on one side we sometimes find a morbid exclusion of the common fraction, and on the other side we hear the taunt, you are departing from the decimal *principle*. For myself, I care not one mil for the decimal *principle;* and the manner in which I look on the subject of common fractions as related to decimal convenience—for which I do care—is as follows:—

I exclude *common fractions*, binary or not, from the coins which are to be the units of the main working system, because by admitting them *decimal arithmetic* would be crippled in its details, and its distinctive utility would be destroyed. Decimal arithmetic *deals with fractions as with integers*, and thence derives its peculiar advantage. Thus $1\frac{72}{100}$, 1 and 72 hundredths, is truly 172 for all *working* purposes. For purposes of appreciation and perception it is marked 1·72 or otherwise, in order that 172 of one sort may not be confounded with 172 of another. Hence the great practical advantage of decimal working: *fractions undistinguishable in operation from integers*. When once this great field of facility is fairly reduced into possession, which it never will be if common fractions are intruded of necessity into fundamental operations it is then open to the calculator to learn the manner in which common fractions are to be made use of in all the cases in which they *can* be made useful. And assuredly, a decimal system, well and truly learnt, would be a basis on which common fractions would find uses from which they are now excluded. The decimally educated arithmetician would acquire that power of perception over his *units*, and that freedom from the mysterious notion of *the* unit, which he never can acquire, at least which he very seldom *does*

OBSERVATIONS.

47. This answer deserves consideration. It implies that with the decimal system fractional work will be exceptional. With £ *s. d.* it is the rule, for mental operations. Now fractional work is easier for the memory than decimal (*i.e.*, put down and carry) work. The inference as to mental calculation is obvious.

An example is proposed which I do not work out, because it does not come within the pale of ordinary mental arithmetic. About one person in a hundred might be able to do it without paper—certainly not more, either decimally or otherwise.

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acquire, in a system the units of which are railed off from one another by complex multiplications and divisions. I would ask the advocates of the present system why we hardly ever, if ever, see such quotations as £4½, £12¾, 2¼*s.*, &c.? By the true answer hangs a tale which does not tell well for the existing system. In the question which I am now answering, we have the advocate for a certain decimal system pleading for binary division of his lowest banker's coin. I tell him in reply, that if he will only keep binary division in its place, and not spoil arithmetic by it he shall have a system in which not merely the lowest unit, but every unit, shall be the frequent object of binary division, and non-binary division also, to an extent undreamed of by the operator on quarto-duodecimo-vicesimal difficulty of transformation. One great advantage of decimals is, that common fractions are instruments of greater power. Try 72-193rds of 63*l.* 11*s.* 9*d.* and of 63*l.* 5*fl.* 8*c.* 7*m.*

The person who mixes common fractions with decimals, as fundamental ingredients, may be likened to a tradesman who has sticks of something sold by weight tied up in dozens, and who tries to sell part of a parcel by cutting off the lower end of all the sticks. Common sense would tell him to untie the packet which had been tied up, and to take out as many whole sticks as he might want. This should be his *principle*. But if a case should arise in which it is more convenient to chop off one end of all the sticks, nothing hinders. And still less does anything hinder him from breaking a single stick to make up weight. Let decimals keep their place, and let common fractions keep their place: the load will then be lightened to the utmost. As the old philosophers used to say, Nothing gravitates *in proprio loco*.

QUESTION.

49. If the decimal system is to be tried for the sake of simplicity and convenience in account-keeping and calculation, is it not the most prudent and safe course to make the trial of it, in the first instance at least, as a system of accounts only, without disturbing the coinage?

How far would this be accomplished by simply authorizing the expression of all sums of money in the number of pence of which they consist?

ANSWER.

49. The decimal system is not to be *taken on trial:* it is a demonstrated improvement, or it is nothing. Who, in England, would propose to alter a coinage or a Parliament on trial? What decimalist ever recommended the system in no higher character than as looking so promising that it deserves a trial? If any person were to propose to aggregate themselves to the decimal association on condition that that body should only move for a trial, they would, though I am not sure about the wording, receive the advice which King David gave to his servants—namely, to tarry at Jericho until their beards were grown.

OBSERVATIONS.

49. Here is another assertion of the convenience introduced by decimals into the calculations of the poor—a point not to be settled by assertions. Professor De Morgan's appeal to his experience as a teacher would be important, were it not that he is obviously referring to paper calculation, and not to head work.

Further, this question again supposes that the decimal system is proposed only for its advantages in "account-keeping and calculation," by which the proposer always means large transactions as opposed to smaller ones, which he calls *adjustments*. But it is, in fact, proposed and supported also for its advantages in education, and for the convenience which it introduces into the little calculations of the poor. For example, I, who now answer these questions, and who did what I could to call public attention to the subject long before the agitation commenced, would never have troubled myself about it if its advantages had been confined to merchants and bankers; I should have left those classes to take care of themselves. But as a teacher, I saw the quantity of time which the common system takes, and I saw also the very imperfect results which it produces. As a teacher, I found that it was shorter and easier, with tolerably educated pupils, to turn into decimals, to work them, and to translate the answer back into common denominations, than to use the ordinary processes; and I took up the subject for the benefit of those who have little time for education.

The penny system introduces no decimal system into the world at large, which *must* always calculate in the coins it uses. I believe the commercial world *will* do the same.

QUESTION.

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher clases,—those who keep extensive accounts, and enter into large calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multiples and subdivisions?

ANSWER.

63. The advantage of decimal coinage will be more felt by the poor than by the rich. The effect upon education will be very decided. No one has denied my assertion that 95 hours will be as good as 100 hours now are. Many *think* I have underrated the benefit; I *know* I have done so, and I did it on purpose. And many of the 95 hours will be turned into easy hours instead of difficult ones, or better still, into hours of healthy difficulty followed by feeling of success, instead of hours of mere drag followed by discouragement. By the time the pound and mil system is fairly established, the son of a day labourer will have a much better chance of rising to a clerk's or accountant's place than he now has. By a rough calculation, I am fully satisfied that the pound and mil system will be a much greater boon to the labouring classes than the opening of the public services (India included) is to the middle classes. I mean in the way of putting a rise of life within the reach of the more intelligent of their sons.

OBSERVATIONS.

63. "The advantage of decimal coinage will be more felt by the poor than by the rich." This is asserted on one side, and denied on the other, and, I think not proved by Professor De Morgan. I am not now discussing the educational question, but I may remark that these observations upon it are conclusively answered by Professor Kelland.

QUESTION.

64. In connexion with the foregoing considerations, it has been suggested that a vast majority of the smaller money transactions in a community are not transactions of written account at all; that they arise out of retail purchases made in the market or the shop, the calculations connected with which are necessarily performed in the head, and are not reduced to writing. That for these purposes, namely, adaptation to the existing division of our weights and measures, for distinctness of mental conception and facility of calculation

Professor De Morgan.

in the head, our existing coinage is better adapted than a decimal coinage; whilst the supposed superiority of a decimal coinage for purposes of written accounts and calculations is not applicable to such attractions, and would not prove beneficial to the great mass of the people, with whom such transactions are of constant daily occurrence.

How far do these considerations constitute a just ground of objection to the introduction of a decimal coinage? or what reply can be made to them?

ANSWER.

64. All the transactions of the poor will be facilitated by decimal coinage. But the questions do not come to close quarters on head work at the broken prices which actually occur. Let any number of questions, such as concern the poor, be collected by the Commission, and solved by those who would retain the existing system, in their own way. Let them concern the great articles of daily consumption, bread, cheese, meat, vegetables, beer, tea, sugar, coffee, pepper, tobacco, &c., &c. Let them be taken from actual prices; let it be stated for each whether it is to be done by pen work or by head work, and let the work of the common system be handed to me. I will undertake to add the way of working in the decimal system, and I will make it apparent that the medley of our weights and measures adapts itself to a decimal coinage better than to the existing coinage. A hundred or two questions, in answer to my challenge, will be much more to the purpose than general arguments about *clean* fractions, which can only be supported upon *even* prices. The questions proposed are worthless as a trial of the actual wants of calculation of the poorer classes.

OBSERVATIONS.

64. A repetition of the same assertion, followed by a challenge, which, if understood as referring mainly to mental work (the most important test by far), is perfectly fair. But to give a challenge is not necessarily to gain the day. However, I am doing more than the Professor asks, for I am taking as tests his own partial examples instead of the fairly chosen ones which he suggests. Even with this disadvantage, the £ *s. d.* sums work more readily in the head than the decimal calculations. As to paper reckoning, I acknowledge that the superiority is on the other side.

J. A. Franklin.

J. A. FRANKLIN.

OBSERVATIONS.

This paper contains some general assertions that decimals would facilitate mental reckoning; but the question is not argued, and no examples are given.

Sir J. F. W. Herschel, Bt.

SIR J. F. W. HERSCHEL, Bart.

QUESTION.

2. On what grounds does your objection to our present system of Coins rest?

ANSWER.

On the grounds—(*a*) That it is inconvenient; (*b*) circuitous; (*c*) needlessly complex; (*d*) productive of arithmetical difficulty, and thereby affording openings for error; (*e*) a cause of the loss of much valuable time in the practical business of life; (*f*) a clog on educational progress, and, as such, a grievance and an injury to the community; (*g*) obstructive of clear and synoptic views in all financial and statistical discussions where money prices are concerned.

(*g*) *Obstructive of clear views in commercial, financial, and statistical discussions.*—A few questions will illustrate the sort of obstructions complained of—

(α) What per cent. is an income-tax of 7*d.* in the pound?

(β) Who sees, when it is first proposed to him to pay 16*d.* in the pound, that this means one-fifteenth part of his income?

(γ) What is the difference to the revenue whether a duty is $7\frac{3}{4}d.$ or $9\frac{1}{2}d.$ in the pound on 50,000 cwt.?

(δ) On a population of 29 millions, what is 1*s.* $5\frac{1}{4}d.$ per head?

(ϵ) What per cent. is 8*s.* $7\frac{1}{2}d.$ on 134*l.* 14*s.* $3\frac{1}{4}d.$?

(ζ) What annual rate of interest is $6\frac{3}{4}d.$ per cent. for 11 days?

(η) What is the rate per cent. of interest on an Exchequer Bill at $2\frac{3}{4}d.$ per diem?

Who does not feel that in the innumerable such cases that occur in the sort of subjects above mentioned the system of £ *s. d.* is obstructive, draws off the attention unduly from the subject to the figures, and exhausts it in needless detail of calculation? In all such inquiries the use of logarithms is an immense facility; but to prepare sums for their use, a tedious and harassing preliminary reduction to pence and farthings is almost always necessary.

OBSERVATIONS.

2. (*g*). All these illustrations relate to paper arithmetic except a few per-centage calculations, in which I admit the superiority of decimals; but people do not buy 7 or 8 per cent. of a pound of sugar or tea, but so many ounces or 16ths; and a similar observation applies to all retail dealings. Per-centage reckonings are comparatively if not absolutely rare.

QUESTION.

3. Do you consider them as defective or inconvenient for any of the purposes of retail transactions, *i.e.*, for paying or receiving?

ANSWER.

3. They are not, in my opinion, inconvenient in small retail transactions. Few systems are so when people are used to them.

OBSERVATIONS.

3. Sir John Herschel admits that the present coinage is *not inconvenient* in small retail transactions. This is half, and only half, the truth, viz.,—that it is far better than decimals for all such purposes.

QUESTION.

6. (4.) Is not *the use of the Coinage*, that is, the fitness of the Coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small pay-

ments which arise, the consideration of primary importance, rather than the improvement of a system of account-keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

Sir J. F. W. Herschel, Bt.

ANSWER.

6. (4.) The "use of the coinage" is, no doubt, of primary importance in the choice of a coinage. Any system of coinage must be a bad one which compromises its use. But if twenty different systems of coinage be all very good and useful for a certain purpose, and one of them pre-eminently so for a certain other purpose, and that a very important one, in which all the rest miserably fail, assuredly we ought to prefer that one. Now that is the real state of the case as between the decimal system and the present one, and all others. The decimal has this immense advantage over the other; and, as respects mere convenience in payment, it is fully on a par with any yet devised, besides possessing some other distinct advantages, to be mentioned in their proper places.

Affluent and educated classes versus *poor and uneducated ones.*—The advocates of the decimal system may, I think, justly protest against any enlisting of popular feeling on this score. For my own part, I believe the change would equally benefit all classes, with one very trifling exception, and that in favour of the latter. The subdivision of the pound into 1000 parts instead of 960, and the fact that this minuter subdivision would be kept constantly and systematically in view, while in the present system the farthings are thrust out of sight by habitual disuse, and almost out of knowledge, must have a tendency to make the retail market follow more closely the fluctuations of the wholesale. The retail dealers (I mean no disparagement, and I do not speak of great towns, where there is plenty of competition to keep them in check) take very good care to obstruct its doing so as far as they possibly can, and will always do this, adopt what system we may.

OBSERVATIONS.

6. (4.) The assumption in this answer is that decimals are far superior to £ *s. d.* for account keeping, and not inferior in other respects. The last opinion is at least disputable. I think the examples worked in this paper show it to be decidedly inferior for head work, even when tested by the cases selected by enthusiastic advocates of a decimal coinage. How much stronger would the case against decimals be if Professor De Morgan's challenge were accepted, and the question tried by really impartial examples!

There is not one word as to the most important point as regards the poor—the great facility for small mental reckonings afforded by £ *s. d.*

QUESTION.

8. (1.) Is it not impossible under the decimal system to break the Integer into as many clear fractional parts as we now obtain under our present system of Coins?

ANSWER.

8. (1.) Meaning by fractions aliquot parts, yes; but I consider this as a point of very trifling importance, when brought into competition with the great advantages of the decimal system in other respects.

OBSERVATIONS.

8. (1.) Here, and throughout his paper, especially in the answer to Question 13, Sir John Herschel admits the advantage of the divisibility of our Coins, but considers that it is counterbalanced by other considerations. But he underrates the importance of divisibility, because he always assumes that the advantage is confined to cases where the whole sum handled is readily divisible, as, for instance, where the price is a shilling, the real fact being that the advantage is more or less felt in every mental computation. (See *ante*, Airy, Answer 9.) The following remarks by Professor Kelland completely answer the objection, that divisibility is only of service when the whole sum dealt with is divisible:—"The fact that 1*s.* is divisible by 4 and by 3 renders it the simplest possible instrument for the adjustment of small transactions; *nor is it any objection to this view to state that prices are usually expressed in shillings and pence, so that the fact of the shilling being divisible is of less importance than the consideration of the divisibility of the whole. The argument is valid against the consideration of how to pay, but has no force against the consideration of what to pay. For example, in a retail shop, the determination of the cost of a quarter of a pound of butter at* 1*s.* 5*d. per pound is not worked by dividing* 17 *by* 4, *but by dividing separately* 12 *and* 5 *by* 4."—Kelland, Answer 8.

QUESTION.

11. Is there not great force and truth in the remark of Napoleon, that a decimal system of dividing the Integer and of expressing the fractional parts, must be less favourable to distinctness of conception to facility of recollection, and to readiness and ease in mental calculation, than a binary, or than our present system?

ANSWER.

11. Of all the systems of numeration and subdivision, the purely binary is intelligible to the lowest grade of intellect. But it is not possible to use it as the system of numeration, by reason of the cumbrousness of its expression. When we get above 3 or 4, numbers are considered quite as well *per se*, or as having a certain place and order in a systematic scale, as in the light of multiples and parts—indeed, more so.

5 or 7 is quite as clear a conception as 6 or 8. The number 10101 is far more readily conceived by its decimal numeration than by considering it as consisting of 3367 threes.

Napoleon's dictum, cited above, is inapplicable to ou present system, which is not binary nor duodenary, but a mixed system of both with a vicenary, and is anything but favourable to clearness of conception on this very account. Perhaps this is the right place (since a great name has been called in) to say a few words on the superior "clearness of

OBSERVATIONS.

11. If this answer had been given by any one of less authority than Sir John Herschel, it would scarcely have needed any observation.

It is not pretended by the anti-decimalists, as Sir John assumes, that the advantages of clearness of conception, facility of recollection, and readiness of mental conception are possessed *in the highest possible degree*, by the present system, but only in *a verg high degree*, and one much higher than on the pound and mil system. The highest possible degree would be obtained by a strictly duodecimal system. The foundation of his argument, therefore, fails. But there is a more palpable sophism. He assumes that, if a system is best (or very good) for mental arithmetic, it ought to be substituted for our common notation in simple arithmetic. But I say no. It is not true, as assumed by Sir John Herschel, that whatever system is best for the mental work of everyday life will be best for the more complicated operations of paper arithmetic. The most important

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conception," "facility of recollection," and "readiness of mental calculation," which is claimed for the £ *s. d.* system of reckoning over the decimal. I deny it altogether. For, be it observed, it is a system of reckoning, *i.e.* of numeration, as facilitated by combining units into certain groups, and these again considered as units into certain other groups, and these again into groups of a higher order, and so on, with its appropriate rules for their addition, subtraction, multiplication, and division. Now, if it true, as is pretended, that these three very essential qualities are possessed in the highest possible degree by a system in which units are grouped by pairs, these pairs again by pairs, these higher pairs by dozens, these dozens by scores, and these scores by tens, hundreds, and thousands, &c., then it is impossible to deny that it would be a vast improvement to arithmetic to follow the same principle out wherever number is concerned, since distinctness of conception and facility of recollection are in themselves most desirable things, and since whatever gives readiness to mental calculations must tend in many cases to dispense with pen work, and in all materially to aid it, all calculation being mental, and whatever system aids the mind habitually to make the longest steps with equal security being practically the best system. We ought, therefore, to burn our books of arithmetic and adopt that system of numeration (the monetary system) up to 960, retaining the decimal scale for higher numbers, or rather after the scores, to recur again to the pairs, dozens, and scores, in regular order of succession *ad infinitum*. Now (putting the question of the practicability of such a change quite aside), I do not think anybody will be found to agree to such a conclusion. They will at once fall back on the "regularity of the decimal system." And why? Because it is precisely this regularity—precisely this habit of forming numbers mentally into groups of ten, and rejecting all others, which is found, most of all, to secure clearness, facility, and readiness of calculation both mental and graphical.

aids to common mental reckoning are those which relieve the memory, and these become of no account whatever when tablets are used. *The conditions of the two problems—viz., to find the best system for the head and the best system for paper—have very little in common. The first overwhelming consideration in fixing the Coinage is facility of mental arithmetic, which depends mainly on the divisibility of the numbers used in the scale, and very little on uniformity of progression. Therefore keep the present Coins which are very good. The first consideration for a general system of arithmetical notation is less how to make short mental work easy than how to make paper arithmetic practicable at all where the numbers dealt with may be large, and the nature of the operation complicated. For this end, a regular scale is essential, while divisibility is of secondary importance. Therefore keep your regular progression by tens for common numeration, instead of the irregular one which, notwithstanding its want of uniformity, is preferable for the Coinage.*

QUESTION.

12. (1.) *Ex. gr.*: Which is the more easy for conception, for recollection, or for addition, mentally?—

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

(2.) Again: we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 375 mils?

(3.) The half of 2*s.* 6*d.* is 1*s.* 3*d.*; but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.* 125 mils, &c. &c.?

(4.) Take another case. Any number of yards—7, 8, or 9 yards—at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 miles per yard:

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market?

(5.) Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person, in his head, without pen and ink or pencil, in the midst of confusion?

(6.) But try the same process upon the same sum in decimal notation, namely, as 125 mils. Will the calculation be equally simple and easy?

(7.) Now try it in pence, namely, as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy?

(8.) Again: Price's Patent Candles are advertised in 12 lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally? 12 lb. boxes at 5·50 mils each; how much per lb.?

(9.) Again:

		s.	*d.*		Pence.		Mils.
1	yard or lb. =	2	6	=	30	=	124, for more easy calculation than 125 mils.
$\frac{1}{2}$	do. =	1	3	=	15	=	62
$\frac{1}{3}$	do. =	0	10	=	10	=	impossible.
$\frac{1}{4}$	do. =	0	$7\frac{1}{2}$	=	$7\frac{1}{2}$	=	31
$\frac{1}{6}$	do. =	0	5	=	5	=	impossible.
$\frac{1}{8}$	do. =	0	$3\frac{3}{4}$	=	$3\frac{3}{4}$	=	impossible.
$\frac{1}{10}$	do. =	0	3	=	3	=	impossible.
$\frac{1}{12}$	do. =	0	$2\frac{1}{2}$	=	$2\frac{1}{2}$	=	impossible.
$\frac{1}{15}$	do. =	0	2	=	2	=	impossible.
$\frac{1}{24}$	do. =	0	$1\frac{1}{2}$	=	$1\frac{1}{2}$	=	impossible.
$\frac{1}{30}$	do. =	0	1	=	1	=	impossible.

Now consider the comparative convenience in making the necessary payments.

(10.) 2*s.* 6*d.* is paid with one coin. How many coins will be required to pay 124 mils?

(11.) 1*s.* 3*d.* is paid with two coins. How many coins will be required to pay 62 mils?

(12.) Is it not by cases of this kind that the relative convenience of different systems of coinage must be tested?

ANSWER.

12. It is not easy to exhibit in a few words all the onesidedness of this question, or to answer it in the

OBSERVATIONS.

12. This answer is a fair *argumentum ad hominem*, but that is all. It shows that easy cases

spirit of fair discussion. I will remark, however, 1st, that it takes for granted the present system as the established and habitual one, and throws all the onus of approximations and uncouthness of expression on the new comer. 2ndly, that it deals only with cases of ease to the existing system, and of awkwardness to the decimal. 3rdly, that nine of the cases exemplified take no recognizance of the farthing, while they may be picked out on either side, and its only object is to prove that such arguments are inconclusive. This is certainly true, and I pass over question and answer, as just balancing each other, and leaving the matter where it was.

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expect the decimal corresponding ones to take account of mils. The best sort of answer to questions proposed on such principles is to reverse the position, to assume the decimal system to be the established one, and the £ *s. d.* system a candidate for introduction, and to put parallel questions, such as,—

(1.) Which is the more easy for conception, for recollection, or for addition mentally :—

Mils.		*s.*	*d.*		*d.*		qrs.
390	=	7	$9\frac{1}{2}$	=	$93\frac{1}{2}$	=	374
170	=	3	$4\frac{3}{4}$	=	$40\frac{3}{4}$	=	163
40	=	0	$9\frac{1}{2}$	=	$9\frac{1}{2}$	=	38
600		11	$11\frac{3}{4}$		$143\frac{3}{4}$		575

(2.) Again, we know at once that the half of 466 mils is 233 mils ; but what is the half of 9*s.* $3\frac{1}{4}$*d.* ?

(3.) The half of 124 mils is 62 mils ; but what is the half of 124 mils estimated in £ *s. d.*, viz. 2*s.* $5\frac{3}{4}$*d.* and $\frac{1}{25}$qr ?

(4.) Any number of yards—say 7, 8, or 9—at 40 mils, 60 mils, 80 mils, or the same number at 9*d.* $2^{qr}\frac{2}{5}$, 1*s.* 2*d.* $1^{qr}\frac{3}{5}$, 1*s.* 7*d.* $0^{qr}\frac{4}{5}$ per yard, which calculation will be made with the greatest readiness and accuracy mentally and in the open market ?

(5.) Take 60 mils—double it—triple it—halve it—divide it by 3 and by 5, and add all the products together. Is not this easily done by any common person, &c. &c. ?

(6.) But try the same process on the same sum in £ *s. d.* notation, namely, as 1*s.* 2*d.* $1^{qr}\frac{3}{5}$, Will the calculation be equally simple and easy ?

(7.) Now try it in pence ; viz., at $14\frac{2}{5}$*d.* Is it a bit more easy ?

(8.) Again : Price's Patent Candles, under a decimal system fully established, would be advertised in 10 lb. boxes at 46c. each. Every one knows that this would give 46m. per lb. for the candles, but what will the calculation be in £ *s. d.*—10 lb. boxes at 9*s.* 2*d.* $1^{qr}\frac{3}{5}$ each ? How much per lb. ?

(9.) Again :

		Mils.		*s.*	*d.*		
1 yard or lb.	=	420	=	8	$43^{qr}\frac{1}{5}$	=	402^{qr}, for more easy calculation than $403^{qr}\frac{1}{5}$.
$\frac{1}{2}$ do.	=	210	=	4	$2\frac{1}{4}$	=	201^{qr}
$\frac{1}{3}$ do.	=	140	=	2	$9\frac{1}{2}$	=	134

		Mils.		
$\frac{1}{4}$ yard or lb.	=	105	=	impossible.
$\frac{1}{5}$ do.	=	84	=	impossible.
$\frac{1}{6}$ do.	=	70	=	1*s.* $2\frac{3}{4}$*d.* $=67^{qr}$
$\frac{1}{7}$ do.	=	60	=	impossible.
$\frac{1}{10}$ do.	=	60	=	impossible.
$\frac{1}{12}$ do.	=	42	=	impossible.
$\frac{1}{14}$ do.	=	35	=	impossible.
$\frac{1}{15}$ do.	=	28	=	impossible.
$\frac{1}{20}$ do.	=	21	=	impossible.
$\frac{1}{21}$ do.	=	20	=	impossible.

		Mils.		
$\frac{1}{28}$ yard or lb.	=	15	=	impossible.
$\frac{1}{30}$ do.	=	14	=	impossible.
$\frac{1}{35}$ do.	=	12	=	impossible.
$\frac{1}{42}$ do.	=	10	=	impossible.
$\frac{1}{60}$ do.	=	7	=	impossible.
$\frac{1}{70}$ do.	=	6	=	impossible.
$\frac{1}{84}$ do.	=	5	=	impossible.
$\frac{1}{105}$ do.	=	4	=	impossible.
$\frac{1}{140}$ do.	=	3	=	impossible.
$\frac{1}{210}$ do.	=	2	=	impossible.

Now consider the comparative convenience in making the necessary payments.

(10.) 124 mils would probably be paid in three coins ; but 124 mils is not the equivalent of half-a-crown —the eighth of a pound. Were it thought right (and on the principle of an approximation to a binary subcoinage, some might think it so), a coin of 125 mils might circulate with no greater inconvenience than the half-crown at present, concurrently with the florin.

(11.) Three perhaps—or thus ; 30^{m} is paid in one coin. How many coins will it take to pay $7\frac{1}{4}$*d.* ?

(12.) Assuredly not. Such comparisons can never by possibility arise except in the brief interval of transition from one system to another. They vanish when either is established. Besides, they are one-sided, and therefore *pro tanto* unfair ; and it is not by questions capable of being so qualified that the merits of any proposal can be tested.

QUESTION.

13. (1.) The defectiveness of any system founded on the decimal principle consists in the imperfect divisibility of its integers.

ANSWER.

13. (1.) This is, in a few words, a faithful summing up of all that can be urged against the decimal principle in general. If the divisibility of the base of a system of numeration into many factors increased in the least degree the divisibility of numbers in general, it would have much weight. But 41 is quite as incapable of aliquot division, and 143 quite as incapable of being resolved otherwise than into 11's and 13's, whether these numbers be expressed decimally, duodecimally, or in any other way. Even taking the much-vaunted system of duodecimal arithmetic, its real advantages, if adopted, would be : 1st, that numbers would be written somewhat more concisely. 2ndly, that it would be as easy, by inspection, to tell whether a given number is divisible by 11 or 13, as in the decimal system it is to tell whether it is

OBSERVATIONS.

13. (1.) Here is a fair admission ; but it is followed by unsatisfactory argument. The divisibility of the coins, or of the base of a system of numeration, does help calculations by head work, though not so much by paper work, quite irrespectively of the divisibility of the numbers dealt with. See examples of division by factors of 10 and 100 as a proof (Ans., p. 86) ; and see also the above observations on Mr. Airy's example (Ans. 9, p. 47 ;) and on Ans. 8, at p. 61). Here and elsewhere Sir J. Herschel dwells on the importance of ascertaining whether a number is divisible by 3, or 9, or 11, or any other number. But it is seldom of any use to know this. We have in actual life to divide as we best can by the numbers which the problem requires, not to pick out the numbers by which we can divide exactly. Among the

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divisible by 9 or 11, and a trifle more easy to tell whether it is so by 3 or by 9, and that $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{9}$ would not require to be expressed by repeating duodecimal fractions, though $\frac{1}{3}$ would. But, on the other hand, it would not be possible, without actual trial, to say whether it could be divided by 5. Other advantages I really know none, except that dozens would be spoken of oftener, and scores seldomer than at present. Six would be called half a dozen, but four would not be called the third of a dozen, &c. &c.

advantages which Sir John Herschel cannot discover in duodecimal arithmetic is included the possibility of working sums in the head by the method ordinarily used with the present coinage, which is almost impossible with a decimal scale; but I do not pursue this topic, as I am not now discussing duodecimals, but the comparative advantage of decimals and £ *s. d.* for mental work.

QUESTION.

14. (7.) If we now proceed to subject these total sums (4*l.* 7*s.*, 4,342*m.*, and 1,044*d.*) to division, which system will be found the most convenient.

ANSWER.

14. (7.) The errors being rectified in the items of the proposed question, the total sums (4350*m.* or 435*c.*) are just as easy of division as that of the pence (1044), indeed easier; for the divisibility by 5 is obvious on the cents; that by 5, or by 2, or by 10, on the mils; and that by 3 on both. 1,044, indeed, is divisible by 9, which 4,350 is not; but then 1,044 is not divisible by 5, or thus, 1,044 × 4 = 4,176, has three prime factors, 2, 3, and 29, while 4,350 has four—viz., 2, 3, 5, and 29. This is as regards the penny system,—as to 4*l.* 7*s.*; in that form it is not divisible at all. Nobody, without reduction, would suspect it to be divisible by 9, though everybody would see that 4.350*m.* is so by 3 or by 5.

OBSERVATIONS.

14. (7.) The last remark as to ascertaining divisibility by specified numbers again applies.

QUESTION.

15.

£.		*s.*	*d.*		Pence.		Mils.
1	=	20	0	=	240	=	1000
$\frac{1}{2}$	=	10	0	=	120	=	500
$\frac{1}{3}$	=	6	8	=	80	=	—
$\frac{1}{4}$	=	5	0	=	60	=	250
$\frac{1}{5}$	=	4	0	=	48	=	200
$\frac{1}{6}$	=	3	4	=	40	=	—
$\frac{1}{7}$	=	—		=	—	=	—
$\frac{1}{8}$	=	2	6	=	30	=	125
$\frac{1}{9}$	=	—		=	—	=	—
$\frac{1}{10}$	=	2	0	=	24	=	100
$\frac{1}{11}$	=	—		=	—	=	—
$\frac{1}{12}$	=	1	8	=	20	=	—
$\frac{1}{13}$	=	—		=	—	=	—
$\frac{1}{14}$	=	—		=	—	=	—
$\frac{1}{15}$	=	1	4	=	16	=	—
$\frac{1}{16}$	=	1	3	=	15	=	—
$\frac{1}{17}$	=	—		=	—	=	—
$\frac{1}{18}$	=	—		=	—	=	—
$\frac{1}{19}$	=	—		=	—	=	—
$\frac{1}{20}$	=	1	0	=	12	=	50

(1.) By this table it appears that going down as far as the shilling the £ is divisible under our present system, and under the penny system, into eleven distinct aliquot parts; whilst under the mil system, it is divisible only into six aliquot parts.

(2.) But observe further the sub-divisibility of the quotients obtained under the present and the penny system, compared with those obtained under the mil system.

(3.) The $\frac{1}{8}$*l.* represented by 2*s.* 6*d.* or 30 pence, or 120 farthings, is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, giving respectively 1*s.* 3*d.*, 10*d.*, 7½*d.*, 6*d.*, 5*d.*, &c.; whilst the same sum represented by 125 mils is divisible only by 5 and 25, giving as the result 25 mils and 5 mils.

(4.) Again: the $\frac{1}{10}$*l.*, represented by 2*s.* or 24 pence, or 96 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48, giving respectively 1*s.* 8*d.*, 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1½*d.*, 1*d.*, ¾*d.*, and ½*d.*; whilst the same sum, represented by 100 mils, is not divisible into a third or an eighth part, or any of their subdivisions.

(5.) The same may be said again of the shilling, which, represented by 12 pence or 48 farthings, may be divided by 2, 3, 4, 6, 8, 12, 16, 24, giving respectively the sums 6*d.*, 4*d.*, 3*d.*, 2*d.*, 1½*d.*, 1*d.*, ¾*d.*, ½*d.*: whilst the same shilling, divided into 50 mils, is divisible only by 2, 5, and 25, giving the sum 25 mils, 5 mils, and 2 mils.

ANSWER.

15. Aliquots of a pound as expressed in £ *s. d.*, pence, and mils. This is fair argument (at least as far as P. 5.) It is admitted that the Decimal System carried to mils has fewer absolute aliquots of the unit of account in it than the £ *s. d.* system. *Valeat quantum.* After all, it is no disadvantage worth speaking of. The chief use of these aliquots is to facilitate the arithmetical rule of "Practice"—a rule of short cuts and expertnesses, which is cast aside in the Decimal System as not worth the trouble of acquiring. Anybody who has to pay 3*s.* 4*d.*, or to bargain for 1*s.* 8*d.* per yard, cares very little whether the sums are aliquots of a pound or not.

As to the sub-aliquots or aliquots of aliquots—no doubt for "practice" they are useful. But observe, that, in the mil system, such numbers as 30, 60, 120, 180, 42, 84, 96, 210, 420, &c., which have many

OBSERVATIONS.

15. The assertion that the chief use of the aliquots referred to is to facilitate what is technically called practice, is questionable. The real use is to facilitate all mental reckoning by head work; and if this be included in the term practice, then practice is for daily life worth all other arithmetic put together. The truth is, that the short cuts and expertness spoken of are the foundation of the arithmetic of the poor, even of those who scarcely know how to "put down and carry." Observe, too, with reference to the last part of the answer, that the divisors as to which the present system is said to be defective, are 5, 7, 9, 11. This inconvenience may be endured, while it is confessedly the best for such divisors as 2, 3, 4, 6, 8, 12, and 16.

aliquots, present themselves on the face of sums. Whereas on the £ *s. d.* system, 2*s.* 6*d.* has to be turned into sixpences, or pennies, or farthings to perceive its divisibility, and in such sums as 8*s.* 9*d.*, the divisibility by 5, 7, 14, 28, is so concealed that nobody would perceive it without reduction to units of one denomination. The £ *s. d.* system is one which almost studiously conceals divisibility by 5, 7, 9, 11.

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QUESTION.

16. Is the introduction of the Decimal Principle into our coinage desirable without reference to what may be the system of weights and measures in this country ?

ANSWER.

16. I think so, on the homely principle that a slice of a loaf is better than no bread. I am persuaded that under all systems of weight and measure, not studiously perverse, goods would quite as easily be bought and sold, and paid for in a decimal or in any other currency when once familiar and established, and there had been time for the habitual compromise between the niceties of price and the niceties of currency, which is sure to take place in an established system. To bargain for three ounces avoirdupois of a commodity at five or at seven units per lb. is as great a difficulty, whether the units be pence, cents, or groschen. However, it is admitted on all hands that more than half the advantage of a Decimal System of money would be wanting if not accompanied, or followed by one of weights and measures. Nevertheless, that a Decimal System can work with perfect ease and satisfaction in conjuction with the present British system of weights and measures, is demonstrated by the instance of the United States, whose system of weights and measures is identical with our own.

OBSERVATIONS.

16. If Professor Kelland, Mr. Goddard, and Dr. Gray are correct in their facts, the Americans still cling to shillings and sixpences in mental reckoning, in spite of having a Decimal coinage 60 years old—some tribute to the superior convenience of our coinage for such purposes.

This answer explains much that is found in these papers. The reason why the decimalization of coins is so strongly urged is obviously less for its own merits, than because it is expected that decimal weights and measures will follow. If this were certain, it would be material, but the larger change has not yet been proved to be practicable or expedient. The conclusion of the committee on the subject was adverse, and the experience of America is against it.

QUESTION.

20. Take the case of an article now selling at a shilling per pound or per yard, and retailed in halves, quarters, ounces, or inches, these fractional quantities are easily and readily paid for in our present coins. But if our Coinage be subjected to the Decimal Principle of division, will not that facility be lost ?

ANSWER.

20. (Report 1853, Decimal Commission, Question 1020.) Mr. Lindsay's Evidence (grocer and tea dealer). Is a shilling a very common price for articles ? *A.* Not in our business. (Preliminary Report on Decimal Coinage, 1857, Question 362.) Dr. Gray's Evidence.—Dr. Gray gives "a list of the articles exhibited in a mercer's window, High-street, Islington, on May 13th, 1856, with the prices in our present coinage, and how they will be marked should the £ and mil system come into use." The articles are 50 in number, varying in price from 19*s.* 6*d.* to 2¾*d.*, and among them is only one priced at 1*s.*, viz. "lawn per yard," and only one other priced at an exact number of shillings. Of this list, the majority consists of indivisible articles, but among them are 20 divisible, or on sale "per yard," and of these only two are priced at an exact penny, while 18 have odd halfpence or farthings. And among all the 50 there is only one (1*s.*), which is an aliquot part of a pound. Dr. Gray, in reference to the mil prices annexed, observes,—"I can well conceive the feelings of the lady customers on seeing the prices so marked," assuming them to be impressions of disgust. To one habituated to the Decimal System, however, quite as intense an impression of a similar nature would arise on sight of the prices in £ *s. d.* actually affixed. Such being retail, it is needless refinement to insist on those cases of easy subdivision and aliquots in the presence of vast and important general considerations. They are utterly overwhelmed and swept away in the mass of petty give-and-take transactions, which occur in buying and selling over the counter; and among the number of considerations which weigh in the mind of a shopkeeper in deciding upon the ultimate farthing or mil which he shall demand, or of his customer which he shall haggle upon, I do not believe either party ever attributes the smallest weight to their consideration. In reply to the question, therefore, I can only say that I do not believe any facility of the sort, worth speaking of, will be lost by adopting the Decimal Principle. So long as we pay by tale and not by weight, so long will there exist this margin of uncertainty and haggling.

OBSERVATIONS.

20. In mentioning the odd halfpence introduced into their prices by linen-drapers, Sir John is stating a familiar fact; but it is not so in other trades, and odd halfpence do not interfere at all with mere division (where they can generally be neglected), and scarcely at all with multiplication (where they are first omitted in the reckoning, and then allowed for by a separate, almost instantaneous computation). For an example, see the observations below on the 12th answer of Professer Miller, at page 69.

QUESTION.

23. In the Report of the discussion, at the Institution of Civil Engineers, of Mr. Yates' Paper on the French System of Measures, Weights, and Coins, the following passage occurs (p. 60):—

"The pound sterling, consisting of 960 farthings, admits of 19 divisions* without a remainder; but if divided into 1,000 parts, it only admits of 8 divisions. Existing Weights and Measures are chiefly reckoned by 2, 4, 8, 12, 20, 24, 36, &c., which admit of divisions by existing moneys; but if a monetary decimal system be adopted, without also adapting it to weights and measures, it must be evident that the number of fractions will be greatly multiplied. Decimal coins will not accord with the fractions of a pound of 16 ounces, nor with those of a yard of 36 inches. Purchases of ½, ¼, ⅛, 1/16, &c., of any integer could not be paid for decimally without incurring a loss by fractions not represented by Coins. Now those are precisely the quantities in which the working classes principally make their purchases; consequently they would be the chief sufferers by the introduction of a Decimal Coinage, unless there is a simultaneous adoption of Decimal weights and

* Qy.—960 admits of 27 divisions not 19; 1000, of 15 divisions, not 8.

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measures. This anomaly was severely felt in the United States; and to obviate the inconvenience, Spanish pieces of $6\frac{1}{4}$ and $12\frac{1}{2}$ cents, although illegal coins, were of necessity employed."

Must the truth and force of this statement be admitted, or, if not, what answer can be given to it?

ANSWER.

23. See answer to Question 20. Mr. Yates omits the divisor 7 in his enumeration. It needs only to consult any priced list to be satisfied of the small percentage of cases to which this argument from aliquot subdivision applies. As regards the $6\frac{1}{2}$ and $12\frac{1}{2}$ cent pieces in America, it should be observed that the American cent is $\frac{48}{100}$ of a shilling (taking the dollar at 4*s.*), or almost exactly $\frac{1}{2}$ penny. If, then, the exigencies of American retail required the use of the farthing, or its equivalent the half-cent at a time when there was no such coin as a half-cent, there was no remedy but to resort to a foreign coin. There is no doubt that in New York, and perhaps in other great cities in the United States, as in our own, the farthing is wanted. [The fare of an omnibus in New York is $6\frac{1}{2}$ cents, and is probably usually paid in such a coin as Mr. Yates mentions; but that a Spanish copper coinage can pervade the Union as a matter of necessity, is quite incredible.] In fact, it appears from Mr. Snowden's Report to the Secretary of the United States Treasury (Prelim. Rep. Dec. Comm. 1857, p. 340), that there exist now abundance of half-cents which have been coined by the United States Mint. This circumstance proves that the American unit of value (the dollar) is just double what the exigencies of commerce require, and that the florin, whose centesimal is about the minimum coin required (or the pound, whose millesimal is so), is the better unit. As regards the arguments for aliquots and for the binary and tertiary system of subdivision, see also M. Michel Chevalier's Letter to Lord Monteagle (Rep. 1857, p. 211), which renders further reply superfluous.

As to the practical inconvenience of a Decimal System in money, and not in weights and measures, see Mr. Everett's reply to Questions 25 and 26 of the Circular of H. M. Commissioners. (Rep. 1857, p. 339.) As regards the $12\frac{1}{2}$ and $6\frac{1}{4}$ cent pieces (called $6\frac{1}{2}$), see his reply to Question 23 (p. 338). As to any "practical inconvenience" produced by the retention of these coins, see Mr. Ewart's Letter to Mr. Baily. (Prelim. Rep. 1857, 342.) Be that as it may, it appears they are about to be called in, and their use suppressed as a nuisance. (Snowden to Mintern.)

OBSERVATIONS.

23. What appears to me to be the great mistake throughout the paper again occurs here. It seems to be assumed that the advantages of aliquot subdivision are only felt where the whole sum to be dealt with is thus divisible, which no doubt may be "a small percentage of cases." But, in truth, the advantage is felt more or less strongly, and therefore the argument applies more or less forcibly, in 99 out of every 100 sums worked by the head method, the existence and common use of which Sir John Herschel steadily ignores. Every example contained in these papers is a proof of this; but see in particular the observations on the 9th answer of Mr. Airy, and ante answers 8 and 13. The reference to M. Chevalier's letter is curiously inapplicable to the question of mental arithmetic. M. Chevalier admits the great importance of divisibility especially by binary factors, for the purposes of mental arithmetic, and his defence of a decimal system is founded on the following assertion which he makes:—"Aujourd'hui presque tout le monde écrit et calcule avec la plume au lieu de calculer de tête." The answer to this is obvious—that many are still unable to calculate with the pen, and that, even among those who are able to do so, the number of daily calculations in the head enormously exceeds the number worked with the aid of paper and pen. Instead of rendering further reply superfluous it would be nearer the truth to say that M. Chevalier's letter renders it impossible.

QUESTION.

36. (3.) In a communication from the Rev. Joshua Leavitt, of New York (p. 48 of the same Report), this further remark occurs:—

"I have no doubt of the superiority of the decimal system for the purposes of accounts, and am astonished that other countries have so long delayed its adoption. Our experience of the benefit of our federal currency in this respect is all one way. The saving of time and labour is prodigious, and the advantage in point of correctness and of the facility of detecting errors unquestionable. But for the purposes of small circulation, in marketing, huckstering, and the like, I am persuaded that a duodecimal currency like that of England, or like that which formerly prevailed in the city of New York, is far preferable. These small transactions of daily life outnumber the transactions of commerce almost infinitely. And it seems impossible to make a decimal currency as convenient in these as the old currency."

ANSWER.

36. (3.) Mr. Leavitt seems to contemplate as practicable a decimal system of account-keeping concurrent with an £ *s.* *d.* system of money payment. I do not believe this to be practicable. Any one now may if he please keep his accounts decimally, but he will have a table to consult, or a calculation to make at every entry. We must choose between the two courses, and we must balance between those vast and prodigious advantages which Mr. Leavitt so justly states on the one side, and the very much exaggerated amount of inconvenience in the huckstering departments of commerce, which an overwhelming mass of testimony from countries where a Decimal Coinage exists, shows to disappear altogether in practice, or, at most, to be of infinitesimal importance.

OBSERVATIONS.

36. (3.) Reduction to decimals would not require the consulting a table or the making of a calculation. The table would soon be in the head like the multiplication table (see the practical evidence of Mr. Finlayson, which is conclusive against Sir J. Herschel's speculative opinion that the concurrent system is impracticable, and even that of Professor De Morgan). But this is wandering from the subject of mental arithmetic. This answer is important, however, as it admits the fact, though it questions the amount of the inconvenience which decimals would introduce into "huckstering traffic." If I am right in thinking that the quantity of such traffic makes it by far the most material thing to be considered, Sir John Herschel becomes almost a supporter of the present coinage. Sir John Herschel has himself answered his own appeal to foreign experience, by saying—what is, no doubt, quite correct—that few systems are inconvenient when people are used to them (Ans. 3, p. 95); but the question for us is the *comparative* convenience of the two systems, and the judgment of foreigners helps us very little here.

QUESTION.

36. (4.) "One reason is, that the decimal currency admits of only one aliquot division, that is, into halves. The shilling can be divided into halves, quarters, thirds, sixths, and twelfths; and if it were needed, a coin of the value of two-thirds of a shilling would be found manageable. In all these countless small transactions which I have referred to, and in which every man is employed many times every day, this capability of subdivision is

of great convenience. We are constantly buying a half of a thing, or a quarter, the eighth, the one-third, and so on. If the price is a dollar, we can make the change for one-half, for one-quarter, and if one, two, or more pence, with our decimal currency; but we cannot pay the exact price of one-third, one-sixth, one-eighth, one-twelfth, or any other of the fractional parts. If the price is half a dollar, we can only pay for one half, one-fifth, and one-tenth. If the price is a quarter of a dollar, we can pay for no aliquot division whatever. This is a constant inconvenience, and can be got along with in no other way than by *disregarding small differences*."

ANSWER.

36. (4.) The convenience in question only exists when the price of the unit is a readily subdivisible one. These cases in the present system are not the majority, nor even a large minority. Under the decimal system, carried to mils, subdivisible prices would probably be more common than at present.

OBSERVATIONS.

36. (4.) Again, the assertion (the mistake, I think,) that aliquot divisibility of the coins is only material in cases of readily subdivisible prices. It is always of some advantage; but I have said enough on this point.

QUESTION.

42. If it be admitted that for all ordinary retail transactions, for the purposes generally of paying and receiving, our present coinage is satisfactory, whilst the inconvenience is found to arise when we come to processes of account-keeping and calculation, does it not follow that our present coins ought, if possible, to be retained without any change, that some decimal system of recording the various sums should be introduced, and that we should decimalize our accounts, retaining our present coinage in all respects unchanged?—See No. 37.

ANSWER.

42. If this were practicable without introducing greater inconvenience, it would long ere this have been adopted. Any one may, if he pleases, now record his receipts and payments decimally.

OBSERVATIONS.

42. I stop to note in this answer a very true and very material remark, though foreign to my immediate subject, viz., that any one may, if he pleases, record his accounts decimally; but the inference that the neglect of this practice proves it to be inconvenient, is unfounded. Habit rules in these matters. See Mr. Page's evidences as to the inconvenient way in which some countries persist in quoting exchanges. And see Mr. Finlayson's evidence as to the facility of using decimal calculation and accounts with the present Coinage.

QUESTION.

49. (1.) If the Decimal System is to be tried for the sake of simplicity and convenience in account-keeping and calculation, is it not the most prudent and safe course to make a trial of it, in the first instance at least, of a system of account only without disturbing the coinage?

(2.) How far would this be accomplished by simply authorizing the expression of all sums of money in the number of pence of which they consist?

ANSWER.

49. (1.) To use it as a system of account without coins to correspond, if voluntary, would ensure its rejection. People will not translate their receipts and payments into another language before they enter them up in their books. If compulsory, it would be received with a storm of indignation as a needless and most galling hardship. It might certainly be used, however, in stating the public accounts.

(2.) It would not be accomplished at all. See answer to Question 43 (1.) and 45 (3.)

OBSERVATIONS.

49. (1.) A similar reply is here repeated. This "galling hardship" is necessarily involved, together with many others, in a change to decimal coins.

If men cannot endure to be driven to decimalized accounts, how would they submit to be forced into the use of a decimalized coinage? The compulsion might be more effective, but the hardship would not be less—but, on the contrary, much greater.

QUESTION.

56. (1.) Under our present system, is not the high value of our Integer, the £ sterling, a source of great convenience and advantage, especially as compared with the lower value of the franc in France and the dollar in America,—

(2.) First, as facilitating the conception in the mind of large values, and expression of them in fewer figures and with fewer words;

(3.) Second, as admitting of a greater multiplicity of clean fractional divisions?

ANSWER.

56. (1.), (2.), (3.) The high value of our integer 1*l.* is advantageous as a unit compared with the dollar, inasmuch as it admits of a really available division into 1000 mils, giving the mil a visible and tangible existence, which the dollar does not. It has some (though a very trifling) advantage over the French franc in respect of the consideration, (2.) *i.e.*, in our eyes, though in France, where individual fortune and expenditure are not so large as in England, the franc is a better unit. There is no advantage in multiplying the clean fractional subdivisions of a unit already small enough not to need much subdivision. Were the franc divided into 960 parts, only the larger fractional subdivisions would ever be used. As to the advantages of "clean fractional subdivision" generally, I consider them exaggerated, in the prominence in which they are placed in these questions; at the same time not denying it to have some, and those by no means unimportant.

OBSERVATION.

56. (1.) Again the advantages of divisibility are admitted, but depreciated.

QUESTION.

60. The Decimal scheme now under our consideration will retain the shilling and sixpence as fractional Coins; but will it not destroy the peculiar advantage which now attends them, namely, their convenient

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divisibility? A shilling resolved into 50 mils is divisible only by 2, 5, 10, and 25; but the same shilling, resolved by our present system into 48 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, and 24.

ANSWER.

60. A shilling is divisible into 50 parts under the Decimal System—into 48 under the present. And there will be coins to render the division practicable. Of course, if aliquot divisibility be the only divisibility that is regarded, there is nothing further to be said; the conclusion is against the Decimal System. But this does not appear to me a just view of the matter.

OBSERVATIONS.

60. Another qualified admission. But the real use of aliquot divisibility in facilitating head work is still wholly forgotten.

QUESTION.

61. (1.) Is it not a serious objection to the proposed scheme that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of everything which they require, and to the use of which they are well accustomed; whilst, on the other hand, it will give them the divisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use?

ANSWER.

61. (1.) Any man, poor or rich, can purchase either a third or fourth part of anything divisible which he is able to pay for, and the shopkeeper will tell him the price of it to the nearest farthing or mil. After all, whoever wants to buy a thing must ask the price of it. If a rich person goes to buy a pound of cinnamon, he does not ask the price per cwt.; and if a poor one goes to buy an ounce of tea, why should he not ask the price per ounce? Calculate as he will, he cannot get it a mil cheaper than the shop price; but if he think it dear for the quality, he may go to another shop. Neither are these divisors at all likely to be thrown out of use. There will be plenty of commodities sold at easily divisible mil prices.

OBSERVATIONS.

61. (1.) There seems to be a fallacy here. The easily handled mil prices will not occur so frequently as the easy prices do now. See this point discussed below, pp. 92–94.

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Professor Miller.

QUESTION.

3. Do you consider them as defective or inconvenient for any of the purposes of retail transactions, *i.e.*, for paying or receiving? Or is your objection restricted to the inconvenience of our present coinage for the purposes of account-keeping and calculation?

ANSWER.

3. I consider the present system inconvenient for the purposes of retail transactions. My objection is not by any means restricted to the inconvenience of our present coinage for the purposes of account-keeping and calculation.

OBSERVATION.

3. An opinion, but no reason assigned for it.

QUESTION.

6. Is not the coinage chiefly concerned in the process of buying and selling by retail? and must not the question of the merit or demerit of any system of coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments? Are you aware of any complaint against our present system of coins in this respect?

Is not *the use of the coinage*, that is, the fitness of the coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small payments which arise, the consideration of primary importance, rather than the improvement of a system of account-keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

ANSWER.

6. I cannot allow that the merit of a coinage depends solely on its fitness for small payments, independently of its use in accounts; yet, assuming the merit of a system of coinage to be decided by its fitness for small payments, a decimal coinage would have a great advantage over our present system in finding the price of three or four articles bought at once; also, in giving change.

The substitution of a decimal coinage for our present system would promote the convenience of the most humble buyers and sellers in the long run, quite as much as—probably more than—that of the affluent and educated classes.

OBSERVATIONS.

6. The assumption that decimals would facilitate mental addition is, I think, scarcely justified (see Professor Kelland's answer, referred to *ante* De Morgan, Obs. on Ans. 12, p. 51); but it is quite certain that there would be no considerable difference either way. Division and multiplication are the stumbling-blocks, and the system which surmounts these most readily is pretty certain to be the best. What follows is a repetition of the opinion before given, but still no reasoning.

QUESTION.

8. Is it not impossible, under the decimal system, to break the integer into as many clear fractional parts as we now obtain under our present system of coins? Do you not consider that this is an objection to the decimal system.

ANSWER.

8. I see no advantage in breaking the integer into a large number of clear fractional parts.

I do not consider this an objection to the decimal system.

OBSERVATIONS.

8. Professor Miller concedes less than Sir John Herschel, and cannot see any advantage in the fractional divisibility of the shilling; probably because the common every-day head-work of the poor was not in his thoughts.

QUESTIONS.

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12. *Ex. gr.* : Which is the more easy for conception, for recollection, or for addition mentally ?

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

Again : we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 375 mils ?

The half of 2*s.* 6*d.* is 1*s.* 3*d.*, but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.*, 125 mils, &c. &c. ?

Take another case. Any number of yards—7, 8, or 9 yards—at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 mils per yard :

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market ?

Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person, in his head, without pen and ink or pencil, and in the midst of confusion ?

But try the same process upon the same sum in decimal notation, namely, as 125 mils. Will the calculation be equally simple and easy ?

Now try it in pence, namely, as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy ?

Again : Price's Patent Candles are advertised in 12 lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally ? 12 lb. boxes at 5·50 mils each ; how much per lb. ?

Again :

	s.	*d.*	Pence.	Mils.
1 yard or lb. =	2	6	= 30	= 124, for more easy calculation than 125 mils.
$\frac{1}{2}$ do. =	1	3	= 15	= 62.
$\frac{1}{3}$ do. =	0	10	= 10	= impossible.
$\frac{1}{4}$ do. =	0	$7\frac{1}{2}$	= $7\frac{1}{2}$	= 31.
$\frac{1}{6}$ do. =	0	5	= 5	= impossible.
$\frac{1}{8}$ do. =	0	$3\frac{3}{4}$	= $3\frac{3}{4}$	= impossible.
$\frac{1}{10}$ do. =	0	3	= 3	= impossible.
$\frac{1}{12}$ do. =	0	$2\frac{1}{2}$	= $2\frac{1}{2}$	= impossible.
$\frac{1}{15}$ do. =	0	2	= 2	= impossible.
$\frac{1}{24}$ do. =	0	$1\frac{1}{2}$	= $1\frac{1}{2}$	= impossible.
$\frac{1}{30}$ do. =	0	1	= 1	= impossible.

Now consider the comparative convenience in making the necessary payments.

2*s.* 6*d.* is paid with one coin. How many coins will be required to pay 124 mils ?

1*s.* 3*d.* is paid with two coins. How many coins will be required to pay 62 mils ?

Is it not by cases of this kind that the relative convenience of different systems of coinage must be tested ?

ANSWER.

12. These examples are not fair. The fact that the penny contains four mils is suppressed. The example, to be fair, should have stood thus :—

s.	*d.*	far.		*s.*	*d.*
7	6	3	or	7	$6\frac{3}{4}$
2	6	2	,,	2	$6\frac{1}{2}$
1	3	0	,,	1	3
0	9	3	,,	0	$9\frac{3}{4}$

7*s.* 6*d.* 3 farthings.
2*s.* 6*d.* 1 farthing.

The prices are assumed, so as to be convenient in our present system. In London I often see things marked with such prices as 9*s.* 11*d.* 3 farthings per pound or yard. The prices might have been 5 cents, 7 cents, 12 cents, just as well.

30 pence is a very convenient amount for the performance of this operation, and so would 30 mils be.

I presume the buyer of 1 lb. of these candles would have to pay 1*s.*, and consequently the computation of the cost by the annexed rule would be of but small practical use.

The convenient sum of 30 pence again used, suppose it had been 1*s.* 5*d.*

These examples may possibly be found in some curious old book of arithmetic. But do they occur in the market, and in the huxter's shop ?

A selected case. How many coins will be required to pay 100 mils ?

A selected case. How many coins will be required to pay 20 mils ?

OBSERVATIONS.

12. Here 9*s.* $11\frac{3}{4}$*d.* is proposed as a difficult price (a very strong proof of my last observation). It is one of the easiest prices imaginable when treated at 10*s.* $-\frac{1}{4}$*d.*

	s.	*d.*	*s.*	*d.*
Thus $\frac{1}{4}$ (9	11	$\frac{3}{4}$) = 2	6—	
5 (9	11	$\frac{3}{4}$) = 2*l.*	10*s.*	$-\frac{5}{4}$ = 2*l.* 9*s.* $10\frac{3}{4}$*d.*
8 (9	11	$\frac{3}{4}$) = 4*l.*	— 2*d.*	= 3*l.* 19*s.* 10*d.*

and so on with any operations whatever.

Even Professor Miller's own selected 5 cents, 7 cents, 12 cents, though easy enough, are not quite so handy as 9*s.* $11\frac{3}{4}$*d.* For instance :—

$\frac{1}{4}$ 7 cents = 17 + is less obvious than
$\frac{1}{4}$ (9*s.* $11\frac{3}{4}$*d.*) = 2*s.* 6*d.* —

A more successful choice might perhaps have been made ; but, as the answer stands, a price chosen as particularly difficult for £ *s. d.*, turns out to be easier to deal with than those picked as the most favourable specimens for decimals.

QUESTION.

18. At present our system of weights and measures, and our system of coins, may be considered as binary. Can it prove consistent with public convenience to abandon the binary, and to adopt the decimal

Professor Miller.

system in our coinage, unless we have decided on the same course in our system of weights and measures ?

ANSWER.

18. The weights for weighing bullion are decimal. No inconvenience would arise from using decimal coinage, leaving the weights and measures unchanged.

OBSERVATIONS.

18. Does this answer mean that it would be as easy to divide mentally by 8 or 16 in decimals as it is now ? If yes, the assertion is surely wrong (see Observations, *antè*, Airy, Ans. 17, page 48) : if no, there would be some inconvenience from the change to decimal coins.

QUESTION.

25. The late Lord Ashburton, in a debate in the House of Commons on this subject, remarked, "That the capacity of division by halves and quarters which attends our shillings is extremely convenient for the common purposes of life, which, upon the whole, is the best criterion of any system." Is this correct or otherwise ?

How is the shilling expressed as 50 mils to be divided into quarters, or the sixpences expressed as 25 mils to be divided into halves ?

ANSWER.

25. Division by 2 is not convenient. It has been frequently remarked, that a gold coinage of 5*s.* would not be so convenient as one of 6*s.*; because, with the former, and the gold coins of 10*s.* and 20*s.* only multiples of 5*s.* could be made up ; while with the latter, 2*s.*, 4*s.*, 6*s.*, 8*s.*, 12*s.*, 16*s.*, &c., can be made up. So also the 4*d.* silver coin is preferred to the 3*d.* coin.

OBSERVATIONS.

25. "Division by 2 is not convenient!" This will scarcely be thought to need an answer.

QUESTION.

30. A great practical authority, Mr. Slater, has stated that one consequence of the introduction of decimal coinage will be made up in parcels of ten each, instead of dozens, as at present. Will not this be less convenient for subdivision than the present practice of making up articles in dozens ?

ANSWER.

30. Is the convenience of subdivision a matter of any importance ? Facility in counting appears to be of much greater value.

OBSERVATIONS.

30. Convenience of subdivision is of great importance, because it is the foundation of the easy head method of reckoning.

QUESTION.

37. Again : Mr. Leavitt bears testimony to the admirable qualities of the Decimal Currency for accounts, but asserts that for small circulation and payments in marketing, huckstering, and the like, a Duodecimal Coinage is also wanted, and preferable to the other. The small transactions of daily life far outnumber the dealings of commerce. And this statement is sanctioned by the concurrence of the Committee of the Legislative Assembly of Canada.

ANSWER.

37. Addition, subtraction, and multiplication, on a small scale, are the chief arithmetical operations required in the market or huckster's shop ; division very rarely. A purchaser asks for one ounce or two ounces, not for $\frac{1}{16}$th or $\frac{1}{8}$th of a pound of tea, with us ; or for 3 or 5 grossi, not $\frac{3}{100}$th or $\frac{1}{50}$th of a libbra of tobacco, in Lombardy. The buyer in one case thinks only of the price of the ounce of the article ; in the other, of the price of the grossi. For, though it makes a good example in a book of arithmetic to deduce the price of the ounce from that of the pound, by dividing by 16, yet in trade it is well known that the price of the pound is invariably less than 16 times that of the ounce, in price, or in weight, or in quality.

In a country where the coinages of two or more countries circulate together, a money of account different from one or all of the material coinages may be possible, though a great inconvenience. With ourselves the inconvenience would not be tolerated.

OBSERVATIONS.

37. This representation of the course of trade is directly at variance with the evidence of tradesmen. See App. I. pp. 165, 166.

QUESTION.

40. Does it not necessarily follow that a system of Coinage based upon a Binary or Duodecimal scale must answer these requirements more completely than a Decimal Coinage, seeing that 12 is divisible by more factors than 10, and that the quotients of such division are again more divisible under the present than under a Decimal system ? And does not our present Coinage afford *peculiar* facilities for continued division into clean fractional parts ?

ANSWER.

40. The advantage of this divisibility is purely imaginary.

OBSERVATIONS.

40. Another bold denial of the advantage of divisibility.

QUESTION.

49. If the Decimal system is to be tried for the sake of simplicity and convenience in account keeping and calculation, is it not the most prudent and safe course to make the trial of it, in the first instance at least, as a system of account only, without disturbing the Coinage ?

How far would this be accomplished by simply authorizing the expression of all sums of money in the number of pence of which they consist ?

ANSWER.

49. This would be quite useless on account of the trouble of converting pence into decimals.

People always think in pounds. A moderate sum expressed in pence would convey no idea.

OBSERVATIONS.

49. "People always think in pounds!" This is true of one per cent. of the population. It is another proof that the Professor was not thinking much of the habits of the great mass of the people.

Professor Miller.

QUESTION.

60. The decimal scheme now under our consideration will retain the shilling and sixpence as fractional coins, but will it not destroy the peculiar advantage which now attends them—namely, their convenient divisibility? A shilling resolved into 50 mils is divisible only by 2, 5, 10, and 25; but the same shilling resolved by our present system into 48 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, and 24.

ANSWER.

60. I see no advantage in the divisibility of the shilling and sixpence.

OBSERVATION.

60. Again, "no advantage" in divisibility.

QUESTION.

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher classes, those who keep extensive accounts, and enter into large calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multiples and subdivisions?

ANSWER.

63. The lower classes will derive a larger benefit than the higher from the abundance of the small coinage put into circulation.

OBSERVATIONS.

63. The abundance of small coinage would be a poor set-off for the sacrifice of an easy method of mental arithmetic—almost the only arithmetic of the poor.

QUESTION.

64. In connexion with the foregoing considerations, it has been suggested that a vast majority of the smaller money transactions in a community are not transactions of written account at all; that they arise out of retail purchases made in the market or the shop, the calculations connected with which are necessarily performed in the head, and are not reduced to writing. That for these purposes, namely, adaptation to the existing division of our weights and measures, for distinctness of mental conception and facility of calculation in the head, our existing coinage is better adapted than a decimal coinage; whilst the supposed superiority of a decimal coinage for purposes of written accounts and calculations is not applicable to such transactions, and would not prove beneficial to the great mass of the people, with whom such transactions are of constant daily occurrence.

How far do these considerations constitute a just ground of objection to the introduction of a decimal coinage? or what reply can be made to them?

ANSWER.

64. I have never found small money transactions so easily carried on as in Switzerland, where the decimal coinage is perfect.

The shillings and pence above nine, especially those which consist of two words—such as sixteen—are very perplexing in calculations performed in the head.

OBSERVATIONS.

64. It is true that 16*s.* is not quite so manageable as 9*s.*; but for every calculation on sums greater than 9*s.*, how many are there on smaller amounts?

For distinctness of mental conception and facility of calculation, the decimal system, in which no small coin would enter with a higher number than 9, is much superior to one in which 10 . . . 19, and 10, 11 occur.

W. Miller.

W. MILLER, Cashier of Bank of England.

QUESTION.

3. Do you consider them as defective or inconvenient for any of the purposes of retail transactions, *i.e.*, for paying and receiving? Or is your objection restricted to the inconvenience of our present coinage for the purposes of account keeping and calculation.

ANSWER.

3. The present irregular gradations of money are a great hindrance to education. This has been well proved, but it is the most serious hindrance to the acquisition of the science of arithmetic to those to whom a thorough knowledge of it would be of the greatest service. Watchmakers, machinists, carpenters, masons, handicraftsmen of all kinds, whose schooling seldom exceeds three years, have no time for scientific arithmetic or practical geometry. Their minds are burdened and confused by the immense number of heterogeneous quantities they have to deal with in compound arithmetic and they make no progress.

OBSERVATIONS.

3. This is founded on the mistaken, or, at any rate, unproved assumption, that compound arithmetic is more difficult than simple arithmetic for mental work. It is true of paper work, and of that only. The examples given in all these papers prove that this is so. But it would be foreign to my purpose to enter into the question of education. Those who wish to do so should consult Prof. Kelland's Answers.

QUESTION.

5. If one of those purposes must to some extent be sacrificed or made subordinate to the other, which do you think is entitled to the priority in our estimation?

ANSWER.

5. I cannot see two purposes. If they are best for accounts and best for calculations, they must necessarily be best for the discharge of those accounts and calculations, being in the same terms.

OBSERVATIONS.

5. It is not conceded that decimals are best for the commonest kind of calculation, viz., that of the shop, and the inference therefore fails. Again I must refer to the examples discussed in this paper.

QUESTION.

6. Is not the coinage chiefly concerned in the process of buying and selling by retail? and must not the question of the merit or demerit of any system of coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments? Are you aware of any complaint against our present system of coins in this respect?

W. MILLER.

Is not *the use of the coinage*—that is, the fitness of the coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small payments which arise—the consideration of primary importance, rather than the improvement of a system of account-keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted ?

ANSWER.

6. It is. A large proportion of the retail purchases are made for the coin's worth, or the articles are made to be sold for the coins. The question of the merit or demerit of any system of coins must depend upon their adaptability to all payments, great as well as small.

I know of no complaint, except that which I have stated in reference to their non-arithmetical relation ; therefore it is that I wish to retain them.

The use of the coinage is undoubtedly the first consideration, and the only object any one could have in altering it would be to add to its usefulness. The use of the coinage is to pay debts, large or small, whether recorded in accounts and the subject of calculations, or reckoned on the spot, without pen, ink, or paper.

Almost all retail market commodities are sold either by tale or by weight.

Vegetables.—Greens, watercresses, spinach, and other small things, are sold for the money's worth.

Turnips, carrots, parsnips, radishes, onions, &c., are made up into bunches to fit certain coins.

Cabbages, cauliflowers, lettuces, celery, horse-radish, apples, pears, cucumbers, melons, and most fruits, are sold by tale according to their size and quality.

Potatoes are sold by weight, generally, in London ; in the country, very often, by the peck. Peas and beans by the peck and its parts.

It is quite clear that here 1000 parts would have the preference over 960, as they would afford more gradations of price.

Fish.—Herrings, mackerel, haddocks, soles, whiting, and nearly all other small fish are sold by tale, as are also lobsters, crabs, oysters, and prawns, according to quality.

Salmon, turbot, cod, eels, and sturgeon are either weighed or sold singly. If weighed, they would be weighed to two ounces. Dried salmon is weighed to an ounce.

Poultry and eggs are sold by tale.

Butchers' meat is sold by the pound.

Bread, butter, bacon, cheese, are also sold by the pound.

But bread is most frequently sold by the loaf without a very nice regard to weight ; and fancy bread, biscuits, and other bakers' commodities are sold by tale. Biscuits sometimes are sold by weight.

The articles here mentioned that are sold by tale, could, as was said of the preceding class, be better fitted with their prices in mils than under the present system.

The articles sold by weight are generally of uneven weight, except butter and bread. You ask for a pound of cheese or bacon, and you get a pound and one or two ounces. Beefsteaks and chops the same ; the vendors cut as close to the weight as they can.

In weighing joints of meat, it is the custom of butchers to weigh only to two ounces. These cases of uneven weight are the most difficult to deal with under the present system, and are supposed by some to be much more so under the mil system ; yet, when they are thoroughly inquired into it is surprising how all the difficulties vanish.

In London alone there are upwards of 20,000 retail shops, in which the fractions of a penny are in constant use.

Of 1000 sales made in these shops, those with the fractions of a penny would bear the proportion of about 480 to 600 with even pence.

OBSERVATIONS.

6. Adaptability to all payments, great or small (*having regard to their comparative frequency*), is no doubt the true test—the greatest convenience of the greatest number.

Take it as correct that 40 per cent. of all retail sales involve the reckoning of farthings ; but observe, that an odd farthing adds very little to the difficulty of the calculation, as I have before pointed out.

But Mr. Miller gives an example which he considers as a fair selection from a very large number of actual cases. Practical tests of this kind are so much more important than any others, that I will examine in some detail how far Mr. Miller's conclusion in favour of decimals is justified by his own illustration.

His work is open to two material observations. One is, that he exhibits the 1st, 2nd, and 4th cases, passing over the 3rd, where the price happens to be 1*s.*, which is especially favourable to the present coins. The other (which is more important) is that, although professing to compare the head work of the two notations, he (like almost all the other witnesses who have drawn conclusions unfavourable to the £ *s. d.* notation) employs in the £ *s. d.* work the methods of paper calculation, which are wholly unsuited to mental reckoning. His inferences would have been very different if he had worked his examples as people do work such sums in real transactions—*i.e.*, somewhat as follows :—

A 1. To find 5½lb. at 11*d.* At 1*s.* is 5*s.* 6*d.* less at 1*d.* is 5½*d.* = 5*s.* 0½*d.*

which is much easier and shorter than Mr. Miller's decimal work, given as B 1. Again, take—

A 2. 1lb. 14oz. at 8*d.* 2lb. is 1*s.* 4*d.* less 2oz. = 1*d.* = 1*s.* 3*d.*

which is, in fact, Mr. Miller's treatment, except that he introduces distinct steps to say that $\frac{1}{8}$ 8*d.* = 1*d.*, and that 15*d.* = 1*s.* 3*d.* ; and, moreover, begins, paper fashion, at the wrong end. However, thus treated the work is rather simpler than the decimal reckoning B 2.

Take now the 3rd case, which Mr. Miller omits :—

A 3. 1¾ at 1*s.* is 1*s.* 9*d.*, it being impossible to put down any intermediate step.

B 3. 1¾lb. at 50. 1lb. is 50, and ¼ 50 is 12½
¾ 50 is 36 + ½ = 37 +.
1¾ at 50 is 87 +.

Lastly, in the 4th case, which is more complicated than the others with either coinage—

A 4. 8¾lb. at 8½*d.* 8lb. is 64*d.* + 4*d.* = 68*d.*
and ¾ (8½*d.*) is 6 + ⅜ makes 74½ +.
= 6*s.* 2½*d.* +.

This is easier in the head than the decimal method given by Mr. Miller ; and it is, moreover, observable that Mr. Miller's process is, in fact, an abandonment of the advantages peculiar to decimals, and an adoption of the class of devices in which they can never compete with a notation like our own. Such short-cuts are, no doubt, as legitimate on one side as the other ; but to use them frequently with decimal coins would be equivalent to giving up the contest : *for the strength of the present system is, the greater readiness with which it furnishes these short-cuts to a result ; the strength of decimals, on the contrary, consists in the universal applicability of the regular processes of simple arithmetic, and the possibility of doing without short cuts at all. To use them at all freely is, in fact, to admit that for head work the quality in which decimals are inferior to £ s. d. is (even when exhibited in a very imperfect form) of more value than the quality which forms the only recommendation of the decimal principle.*

Of the 20,000 shops, there are about 800 cheesemongers and bacon factors, and 1740 butchers. These latter cannot divide their commodities into even pounds; nor always cut off from the mass as much meat, or cheese, or bacon as would exactly meet the requirements of their customers.

I have examined the small books that pass between butchers and their customers in various parts of London and the districts round, and they all tell the same tale, whether you take Giblett's of Bond-street, Bannister's in the City, or any of the suburban tradesmen's books. There is a slight difference in the prices, but the principles upon which the business is transacted are precisely the same.

Out of upwards of 3000 entries, there is not a single instance of weighing below two ounces, except in the case of a steak, or chop, or veal cutlet, where the weight has been below a pound.

The following is a page from one of the books, and is a fair specimen of the ordinary working :—

	A. As it is.				B. As it would be with Decimal Coins.		
1853.	—	Weight.	Price per lb.	—	Weight.	Price per lb.	—
		lbs.		£ s. d.	lbs.		£ F. M.
Apr. 25	1. Shoulder of lamb	5½ oz.	11*d.*	0 5 *0	5½ oz.	46	0 2 53
„ „	2. Beefsteak - -	1 14	8*d.*	0 1 3	1 14	33	0 0 63
„ 26	3. Rumpsteak -	1¾	1*s.*	0 1 9	1¾	50	0 0 87
„ 27	4. Leg of mutton -	8¾	8½*d.*	0 6 2½	8¾	36	0 3 15
May 2	5. Fillet of veal -	8¼ oz.	10*d.*	0 6 10½	8¼ oz.	42	0 3 46
„ 4	6. Lamb chops -	1 6	1*s.*	0 1 4½	1 6	50	0 0 70
„ „	7. Suet - -	½	8*d.*	0 0 4	½	33	0 0 17
„ 5	8. Calves' liver -	1½	8*d.*	0 1 0	1½	33	0 0 50
„ „	9. Leg of mutton -	8½	8½*d.*	0 6 *0½	8½	35	0 2 98
„ „	10. Leg of lamb -	5	10*d.*	0 4 2	5	41	0 2 05
„ „	11. Suet - -	½	8*d.*	0 0 4	½	33	0 0 17
„ „	12. Brisket of beef	8	7*d.*	0 4 8	8	29	0 2 32
				1 19 0			1 9 53

* Errors in the original, which make a difference in the totals.

Let us examine what difficulties there are attending all three* systems in working out these reckonings by head, supposing that they were purchases made in the market to be reckoned instanter.

A 1. 5½lb. at 11*d.* Half is 5½*d.*, and 5 × 11 = 55, and 55 + 5½ = 60½*d.*, which, by the pence table, we know to be 5*s.* 0½*d.*

B 1. 5½lb. at 46*m.* Half is 23, and 5 × 6 = 30, which, + 23 = 53, and 5 × 40 = 200, and 200 + 53 = 253.

A 2. 1 lb. 14 oz. at 8*d.* = 2lb. − ⅛th, and 8*d.* ÷ 8 = 1*d.*, and 8*d.* × 2 = 16*d.*, and 16−1*d.* = 15, and 15*d.* = 1*s.* 3*d.*

B 2. 1lb. 14 oz. at 33 = 2lb. − ⅛th, and 33 : 8 = 4, and 33 × 2 = 66, and 66−4 = 62.

A 4. 8¾lb. at 8½*d.* Call it 9 lbs.−¼. Then ¼ = 2*d.*, and 9 × 8*d.* = 72*d.*, and 72*d.* = 6*s.*, and 9 × ½*d.* = 4½*d.*, and 4½ + 6*s.* = 6·4½, and 6*s.* 4½*d.* − 2*d.* = 6*s.* 2½*d.*

B 4. 8¾lbs. at 36 mils. Call it 9lbs.−¼. Then 36 mils ÷ 4 = 9 mils, and 36 × 9 lbs.—9 mils = 315.

Enough is here given to show that, even in these most trying cases, a decimal coinage is worked by head, and by a head burdened by the pence table, with more facility than the present admits of. It is true there are insignificant fractions of a mil occasionally thrown over—there are the same in the pence, but they are of no consequence to any one; and the great advantage of displacing a system of make shifts, learned by rote, special and technical, for one purely arithmetical, and of universal application, is not to be overlooked.

The poor often buy a single candle, an ounce of butter, an ounce of cheese, a rasher of bacon, half an

W. Miller.

If the question were to be decided by the examples which Mr. Miller has worked there could be no doubt that, for mental calculation, the existing coinage offers far greater facilities than the pound and mil notation.

The working of the remaining examples of Mr. Miller's Butcher's Bill is quite as much in favour of the present coinage as that of those which he has given at length. It may be shortly stated as follows, imitating as nearly as possible Mr. Miller's treatment in the decimal reckoning :—

A 5. 8¼ at 10*d.* At 1*s.* is 8*s.* 3*d.* less at 2*d.* = 16½ or 1*s.* 4½*d.* gives 6*s.* 10½*d.*

B 5. 8¼ at 42. ¼ is 10½, and 8 × 2 is 16, makes 26½, and 8 × 40 = 320, makes 346+.

Not a particularly favourable case for decimals.

A 6. 1lb. 6oz. at 1*s.* 1lb. 4 oz. = 1*s.* 3*d.* and 2 oz. = ⅛ 1*s.* or 1½*d.*, makes 1*s.* 4½*d.*

B 6. 1lb. 6oz. at 50. 6 oz. = $\frac{6}{16}$ 50 = ¾ 12½=3 × 6¼ = 18¾, and 1lb.=50, makes 68¾ or 69−.

I have been obliged in this case to import the fractional treatment into the decimal work. Any other handling would have been intolerable; and this is enormously longer and more troublesome (in the head) than the common work of A 6. I observe that Mr. Miller has got a wrong result in this case, which is not surprising, if he worked it decimally without paper.

A 7. ½ at 8*d.* is 4*d.*

B 7. ½ at 33 is 17−.

Both easy enough, but the former certainly the easier.

A 8. 1½ at 8*d.* is 1*s.*

B 8. 1½ at 33. ½ is 17−, and 33 makes 50−

The £ *s. d.* work undoubtedly the easier.

A 9. 8½ at 8½*d.* 8lb. = 64 + 4 = 68, and ½ = 4¼*d.* makes 72¼, or 6*s.* 0¼*d.*

B 9. 8½ at 35. ½ is 17½, and 8 × 5 is 40, makes 57½, and 8 × 30 is 240, make 297 +, or 298−.

Also a case decidedly in favour of £ *s. d.*

A 10. 5 at 10*d.* is 50*d.* or 4*s.* 2*d.*

B 10. 5 at 41 is 5 and 5 × 40 = 200, makes 205.

Both easy enough.

A 11. ½ at 8*d.* } Same as No. 7.
B 11. ½ at 33 }

A 12. 8 at 7*d.* is 56*d.* = 4*s.* 8*d.*

B 12. 8 at 29 is 8 × 9 = 72, and 8 × 20 = 160, make 232.

This is pretty easy; but the chance of a blunder in working decimally would be ten times as great as on the common system. The difference is one which will perpetually occur, as it arises from the circumstance that higher numbers have to be dealt with, when the fractional mode of representing two denominations in one is departed from. If, again, to remedy this inconvenience, the fractional method is imported into decimals, it will confessedly not work nearly so readily as with 12*d.* to the shilling, and 4 farthings to the penny. Examples A 6, B 6, illustrate this.

I believe that Mr. Miller is quite right in saying that the page he has chosen is a "fair specimen." But can any one doubt that if this is so, the superiority of our coinage over decimals, for the mental work of the shop, is conclusively established? Out of the twelve examples, there is scarcely one in which the superiority of £ *s. d.* is not conspicuous, and in some it is very considerable; while there is not one instance which, when properly worked, shows any advantage on the decimal side.

The remark as to the linendrapers tells against decimals. The sixteenth of a yard is no doubt as easy to reckon with as the ounce; but observe the superiority of the present coinage for both. See No. 6 of the items worked above.

* The third system referred to is that where both coins and weights are decimal. I have omitted that portion of the answer from my extract, as it does not relate to the question which I am discussing.

W. Miller.

ounce of tea, and so forth. Upon these small transactions, they are great losers, and always must be. There is as much trouble in weighing and making up an ounce of tea as a pound. In these minute divisions, besides the loss of time, there is a greater waste.

In these small matters I am convinced that the mil system would be of advantage over the present.

There are 2700 grocers' shops in London. The grocers weigh to exact pounds, half pounds, and quarters, but no lower by the divisional process; they then go to ounces and aggregations of ounces; and this is the case in every other trade where weight is used and exact weights can be given. In all these the pound and mil would serve better than the present system.

There are 1040 linendrapers. These frequently reckon to the one-sixteenth of a yard; but there is no difficulty in this any more than there is with the ounce.

In all these dealings there would be this great advantage, which would be the saving of many a penny in the poor man's marketing, that all persons would reckon to the mil, the 1000th of a pound; while at present there are a great many tradesmen who never go lower than a halfpenny, partly on account of the difficulty of paying a farthing, which would not apply to the mil.

With an abundance of five-mil pieces and the present pence, a difficulty of this kind could hardly be felt.

In considering the "use of the coinage," I have wandered perhaps rather too far; but my object has been to demonstrate, once for all, that, in the distribution of commodities in the retail markets, the mil system of coinage would more effectually answer every requirement than the system of coinage at present in use.

QUESTION.

8. Is it not impossible under the decimal system to break the integer into as many clear fractional parts as we now obtain under our present system of coins? Do you not consider that this is an objection to the decimal system?

ANSWER.

8. It is not impossible; on the contrary, it is obviously quite possible to break the integer into more clear fractional parts than under the present system. Under the mil system, the pound can be divided, of course, by 1000 divisors, without a remainder. Under the present system it can only be divided by 960.

OBSERVATIONS.

8. What are the 1000 divisors without remainder of 1000? The real number of such divisors, omitting unity and 1000 itself, is 14—viz., 2, 4, 5, 8, 10, 20, 25, 40, 50, 100, 125, 200, 250, 500. Whereas 960 has 26.

QUESTION.

9. In an old but very remarkable treatise on "Coin and Coinage," (Vaughan, 1675,) this passage occurs:—

"Of all the numbers, 12 is the most proper for money, being the most clear from fractions and confusion of account, which ought not to be neglected, by reason that, of all other numbers, it is most divisible—being divisible into units, as all numbers are; into two parts, as no odd number is; into three parts, as no even number is but six, and the numbers that consist of sixes; into fourths, into which six is not divisible; and into sixths."

In the Memoir dictated by Napoleon at St. Helena, on the new French system, is this passage:—

"On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux facteurs 2 et 5, et que 12 en a quatre, savoir, 2, 3, 4, et 6. Il est vrai que la numération décimale, généralisée et exclusivement adaptée au mètre comme unité, donne des facilités aux astronomes et aux calculateurs; mais ces avantages sont loin de compenser l'inconvénient de rendre la pensée plus difficile. Le premier caractère de toute méthode doit être d'aider la conception et l'imagination, faciliter la mémoire, et donner plus de puissance à la pensée."

What validity is there in these considerations as objections to the introduction of a decimal system of coinage? Or in what does the fallacy of them consist?

ANSWER.

9. Authority in such matters, weighed against the experience of nations, and the conclusions of reason, is not of much gravity, however old it may be; it only affords additional evidence of the fact that wise men have been mistaken in all ages . . . . . The fallacy of them consists in the supposition that the decimal system renders thought more laborious. It is a fact that the best and quickest mental calculators use the decimal mode. . . . . Man's first instruments of number were the five fingers on each hand.

That they were five was no accident. Nature has a peculiar regard for the number five, and has had from the earliest manifestations of life upon the earth to the present age; and it is no idle fancy nor irreverent to suppose that, as the fingers existed in the Divine mind, and were elaborated in nature, through the rude shapes of the geologic ages, they were five in number because they were destined to become to the future man the most admirable and perfect instruments of his intellectual faculties, and amongst them of that of number. . . . . Our compound arithmetic leads the minds of the generality of people away from the healthy practice of a natural and universal science and encumbers them with a multitude of special contrivances, which make the very idea of arithmetic distasteful in the highest degree.

OBSERVATIONS.

9. It is not, properly speaking, the authority of Napoleon against the experience of nations, but Napoleon's authoritative declaration of the result of his own experience and observation of the working of the decimal system in France. But let Mr. Miller's dictum about authority be admitted. It will leave little to be said for a decimal coinage, the claims of which rest at present mainly on the authority of some distinguished men of science. As to the allegation that the quickest mental calculators use the decimal mode, it is strange, if true. Mr. Miller's theory, that our five fingers were elaborated in the Divine mind, in order to become instruments of decimal arithmetic, is novel. One is in the habit of thinking that, for arithmetical purposes, six fingers on each hand would be better, and that we are hampered with decimals in consequence of having ten fingers.

QUESTION.

10. Must there not be an inferiority as regards fractional divisibility in any decimal system of coins as compared with a coinage founded on a combination of the binary with the duodecimal scale?

ANSWER.

10. You cannot divide a pound by two, and come down either to a shilling, a penny, or a farthing. You cannot divide a shilling by two, and come down either to a penny or a farthing. You cannot divide a pound by twelve, and come down either to a shilling, a penny, or a farthing. You cannot divide a penny by twelve. Wherein, then, consists the combination of the binary and duodecimal properties of the scale? There is no such thing. 12*d.* can be divided by twelve and its factors, so can 12 mils. There is nothing in nature that makes the value of a shilling a constant and unvarying price. There is hardly anything in a grocer's shop, or any other shop, a shilling a pound; but it is just as likely to be 10*d.*, 11*d.*, or 13*d.*, or 14*d.*, or intermediate half-pence or farthings; and it is a curious fact that, of common things, exactly a shilling a pound or yard is an exceedingly rare price, especially those commodities in which the poor principally deal.

Between the farthing and the shilling there are 48 different prices, of course; between the mil and the shilling there are 50. Of these there are prices divisible without a remainder:—

	In the Farthings.	In the Mils.
by 2	24	25
„ 3	16	16
„ 4	12	12
„ 5	9	10
„ 6	8	8
„ 7	6	7
„ 8	6	6
„ 9	5	5
„ 10	4	5
	90	94

Now every one of these prices could be paid in mils without the passing of a single mil, which is an immense advantage over the present scale.

But the overwhelming advantage which the decimal scale possesses is the power of obtaining a per-centage without any arithmetical operation. This capability of division or multiplication by 10, 100, 1000, and so on, is cautiously kept out of view by those who talk about duodecimal and binary combinations.

This proves beyond all question that the decimal system proposed by the Committee of the House of Commons, going no further than the favourite shilling, actually affords four more graduations of price, evenly divisible by prime numbers, than the present scale.

How, then, can there be "an inferiority as regards fractional divisibility" in the proposed decimal system of coins?

OBSERVATIONS.

W. MILLER.

10. A price is not quite so likely to be 10*d.*, 11*d.*, 13*d.*, or 14*d.*, as 1*s.*; but even these (about the worst prices that could be chosen) are manageable; and 3*d.*, 4*d.*, 8*d.*, 1*s.* 3*d.*, 1*s.* 4*d.*, 1*s.* 6*d.*, &c., are almost as easy as the much-complained-of shilling, and the addition of a few odd farthings would not much increase the difficulty. Again, how can Mr. Miller say there is hardly anything in any shop at a shilling a pound, when two out of the twelve prices in his own average specimen of a butcher's bill are exactly a shilling? But, however the fact may be, the comparison is founded on the same fallacy which we have before noticed, that the divisibility of the shilling is useless, unless the whole price dealt with is a divisible number of pence: a mistake, as any one may satisfy himself, by working a few sums in the head, or looking at those worked above.

The "overwhelming advantage" of obtaining a per-centage is, no doubt, material; but such calculations are rare, compared with operations in which decimals would be of no service. It may be admitted that division and multiplication by 10, 100, 1,000, ought not to be kept entirely out of view; but how often did Mr. Miller meet with such operations in the thousands of retail transactions which he examined?

QUESTION.

12. *Ex. gr.:* Which is the more easy for conception, for recollection, and for addition mentally?

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

Again: we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*, but what is the half of 375 mils?

The half of 2*s.* 6*d.* is 1*s.* 3*d.*, but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.*, 125 mils, &c. &c.?

Take another case. Any number of yards—7, 8, or 9 yards—at 1*s.* 6*d.* or 2*s.* 6*d.* per yard, or the same number of yards at 50 mils, 75 mils, and 125 mils per yard.

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market?

ANSWER.

12. 1stly. Were it not that I have the pence-table in my mind, I should say certainly not the first; but it depends upon use.

2ndly. If we have the mils, we shall no longer be working with half-crowns or seven-and-sixpences, but with sums of mils. We make up our minds to relinquish this power when we propose our system of mils. But the half mil is a quantity of no value, except where it is part of a price; and in all cases of that kind, of course it would be expressed. It is not to be supposed that any of the supporters of the mil scheme of coinage contemplate the disuse of vulgar fractions. They might as well think of getting rid of arithmetic altogether.

3rdly. The calculation with the mil system is decidedly the easiest; and when a person becomes

OBSERVATIONS.

12. No. 1. This reference to use is fallacious. We are no more in the habit of dealing with £ *s. d.* than we are in the habit of working sums in simple arithmetic, which is the only habit wanted for decimal coins. Whatever facilities are due to custom, are possessed at present as much by the one system as the other. We must not look to any improvement in simple arithmetic in consequence of importing it into the coinage. We are as well used to it as we are ever likely to be.

No. 2. This is important. To relinquish the power of working fractionally is to lose the readiest method of mental arithmetic. Some of the supporters of the mil scheme—as, for example, Sir John Herschel (Ans. 47)—do appear to contemplate the disuse of vulgar fractions in the way suggested by Mr. Miller.

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accustomed to the values of those regular decimal divisions of the integer, it would be done at a glance.

No. 3. This is palpably wrong as to mental calculation. Let any one try.

QUESTION.

14. In the following table compare the three systems—the present, the mil, and the penny system. With which does the superiority rest as regards,—

1. Number of figures used ?
2. Conciseness of expression in words or in writing ?
3. Facility for mental conception of the sum stated ?
4. Tendency to promote accuracy in copying or calling over ?
5. Facility for calculations, especially those which must be made in the head ?
6. Interchangeability at equivalent value with the coins now in use ?

£	s.	d.		Mils.		Pence.
1	0	0	=	1000	=	240
	17	8	=	883	=	212
	15	6	=	775	=	186
	9	9	=	487	=	117
	6	3	=	312	=	75
	5	7	=	279	=	67
	4	10	=	241	=	58
	3	8	=	183	=	44
	2	4	=	112	=	28
	1	5	=	70	=	17
4	7	0		4342		1044
		27 figures.		34 figures.		28 figures.

If we now proceed to subject these total sums to division, which system will be found the most convenient ?

4*l.* 7*s.*, divided by 3, 4, 6, and 12, gives the respective sums, 1*l.* 9*s.*, 1*l.* 1*s.* 9*d.*, 14*s.* 6*d.*, 7*s.* 3*d.*

Pence 1044, divided by 3, 4, 6, and 12, gives the respective sums of 348 pence, 261 pence, 174 pence, 87 pence.

But 4342 mils is not divisible without a remainder by any of these divisors.

ANSWER.

14. A common triumph the decimal system has over any other is the comparatively small number of figures used ; but it is not so much the smallness of the number of the figures used, as the ease with which they are used, which constitutes the excellence of the decimal system of money.

Such comparisons as these are of no value. They are but "indifferent honest." The best answer to them is, that between the pound and the mil there are 1000 steps ; between the penny and the pound there are 240. Let the farthing be introduced into the comparison, and see how the case stands :—

£	s.	d.		Mils.		Pence.
1	0	$0\frac{3}{4}$	=	1003	=	$240\frac{3}{4}$
0	17	$8\frac{1}{4}$	=	885	=	$212\frac{1}{4}$
0	15	$6\frac{1}{2}$	=	777	=	$186\frac{1}{2}$
0	9	$9\frac{3}{4}$	=	491	=	$117\frac{3}{4}$
0	6	$3\frac{1}{4}$	=	314	=	$75\frac{1}{4}$
0	5	$7\frac{1}{2}$	=	281	=	$67\frac{1}{2}$
0	4	$10\frac{3}{4}$	=	245	=	$58\frac{3}{4}$
0	3	$8\frac{1}{4}$	=	184	=	$44\frac{1}{4}$
0	2	$4\frac{1}{2}$	=	119	=	$28\frac{1}{2}$
0	1	$5\frac{3}{4}$	=	73	=	$17\frac{3}{4}$
4	7	$5\frac{1}{4}$		4372		$1049\frac{1}{4}$
		49 figures.		34 figures.		50 figures.

OBSERVATIONS.

14. The last sentence of this answer is the only one that calls for remark. We have again : 4350 divisible by 4350 different divisors—the old mistake repeated. But compare 4*l.* 7*s.* and 4350 for mental division by 12.

$\frac{1}{12}$ (4*l.* 7*s.*) = $\frac{1}{12}$ (4*l.* 4*s.*), or 7*s.* + $\frac{1}{12}$ 3*s.* or 3*d.* makes 7*s.* 3*d.*

$\frac{1}{12}$ (4350) = $\frac{1}{12}$ (43) or 3 and carry 7, + $\frac{1}{12}$ (75) or 6, makes 36 and carry 3, + $\frac{1}{12}$ (30) or 2, makes 362 and carry 6, or $\frac{1}{2}$ = 362 +.

Which is the easier, having regard not only to length, but to the strain on the memory ?

A similar, though not quite so striking a contrast, is afforded with the smaller divisors.

The penny does not comprehend the whole of our wants.

The following are all the gradations between the farthing and the mil and a shilling. The present system requires 126 figures, the mil 91 figures :—

d.		Mils.	d.		Mils.
$\frac{1}{4}$	=	1	3	=	12
$\frac{1}{2}$	=	2	$3\frac{1}{4}$	=	13
$\frac{3}{4}$	=	3	$3\frac{1}{2}$	=	14
1	=	4	$3\frac{3}{4}$	=	15
$1\frac{1}{4}$	=	5	4	=	16
$1\frac{1}{2}$	=	6	$4\frac{1}{4}$	=	17
$1\frac{3}{4}$	=	7	$4\frac{1}{2}$	=	18
2	=	8	$4\frac{3}{4}$	=	19
$2\frac{1}{4}$	=	9	5	=	20
$2\frac{1}{2}$	=	10	$5\frac{1}{4}$	=	21
$2\frac{3}{4}$	=	11	$5\frac{1}{2}$	=	22

d.		Mils.		*d.*		Mils.
$5\frac{3}{4}$	—	23		$9\frac{1}{4}$	—	37
6	—	24		$9\frac{1}{2}$	—	38
$6\frac{1}{4}$	—	25 half shilling.		$9\frac{3}{4}$	—	39
$6\frac{1}{2}$	—	26		10	—	40
$6\frac{3}{4}$	—	27		$10\frac{1}{4}$	—	41
7	—	28		$10\frac{1}{2}$	—	42
$7\frac{1}{4}$	—	29		$10\frac{3}{4}$	—	43
$7\frac{1}{2}$	—	30		11	—	44
$7\frac{3}{4}$	—	31		$11\frac{1}{4}$	—	45
8	—	32		$11\frac{1}{2}$	—	46
$8\frac{1}{4}$	—	33		$11\frac{3}{4}$	—	47
8	—	34		12	—	48
$8\frac{3}{4}$	—	35				49
9	—	36				50 shilling.

With regard to the number of figures used, it must be remembered that almost all retail accounts have to do with the fractions of a penny. Now, beginning at a farthing and going up to a pound by gradations of a farthing requires 3880 figures, in vulgar fractions, written with difficulty, and applied with difficulty to any arithmetical rule; while the equivalents in mils require only 2685 figures—a difference in favour of the mils of 1195 figures, the mils being, at the same time, all in harmony with arithmetic.

Beginning at a penny, and going up to the pound by gradations of pence, under the present system, it requires 610 figures to express all the gradations; beginning at a mil, under the mil system, would only require 47 figures more.

The penny system destroys our whole system, and does not comprehend our wants.

With regard to conciseness of expression in words, taking the whole of the gradations of the present scale, beginning at the penny and going up to the pound by gradations of pence, requires 5342 letters; while to express the equivalent sum in pounds, florins, and mils, requires only 5211 letters, a difference in favour of the mils of 131 letters. But if we went to farthings, how immensely might we swell this advantage.

Can there be a doubt, when the whole case is stated, as to which are the easiest to work with?

It is the non-interchangeability of the coins at present in use with the money of accounts kept decimally that we complain of, and the reason why we want an alteration. That is our starting-point. By keeping accounts in pence, you do not alter the money. We know that we might at any moment do that; but it would not give us a complete Decimal System unless we went down to the centime, a point too low for us, and involving too many figures.

We might keep our accounts in pence, and pay our debts and receive our credits in pounds and shillings, but no sane person would think of doing so. He keeps his accounts because he wants to know the value of what he possesses, what he has to pay, and what to receive, in the current coin of the realm; and he keeps them in the leading terms of the coinage.

The equivalent of 4*l.* 7*s.* is not £4·342 but £4·350; and if the column had been properly worked out it would have amounted to that sum. Now £4·350 is divisible, without remainder, by 2, 3, 5, 6, 10, 15, 30, 50, whole numbers. It is divisible besides by 4·350 different divisors without a fractional remainder.

No. 14 therefore falls to the ground. Beyond all question, the superiority rests with the mils.

QUESTION.

15.

£		*s.*	*d.*		Pence.		Mils.
1	=	20	0	=	240	=	1000
$\frac{1}{2}$	=	10	0	=	120	=	500
$\frac{1}{3}$	=	6	8	=	80	=	—
$\frac{1}{4}$	=	5	0	=	60	=	250
$\frac{1}{5}$	=	4	0	=	48	=	200
$\frac{1}{6}$	=	3	4	=	40	=	—
$\frac{1}{7}$	=		—	=	—	=	—
$\frac{1}{8}$	=	2	6	=	30	=	125
$\frac{1}{9}$	=		—	=	—	=	—
$\frac{1}{10}$	=	2	0	=	24	=	103
$\frac{1}{11}$	=		—	=	—	=	—
$\frac{1}{12}$	=	1	8	=	20	=	—
$\frac{1}{13}$	=		—	=	—	=	—
$\frac{1}{14}$	=		—	=	—	=	—
$\frac{1}{15}$	=	1	4	=	16	=	—
$\frac{1}{16}$	=	1	3	=	15	=	—
$\frac{1}{17}$	=		—	=	—	=	—
$\frac{1}{18}$	=		—	=	—	=	—
$\frac{1}{19}$	=		—	=	—	=	—
$\frac{1}{20}$	=	1	0	=	12	=	50

By this table it appears that going down as far as the shilling the £ is divisible under our present system, and under the penny system, into eleven distinct aliquot parts; whilst under the mil system it is divisible only into six aliquot parts.

But observe further the subdivisibility of the quotients obtained under the present and the penny system, compared with those obtained under the mil system.

The $\frac{1}{8}$*l.*, represented by 2*s.* 6*d.*, or 30 pence, or 120 farthings, is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, giving respectively 1*s.* 3*d.*, 10*d.*, $7\frac{1}{2}$*d.*, 6*d.*, 5*d.*, &c.; whilst the same sum represented by 125 mi*ls* is divisible only by 5 and 25, giving as the result 25 mils and 5 mils.

Again: the $\frac{1}{10}$*l.*, represented by 2*s.*, or 24 pence, or 96 farthings, is divisible by 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48, giving respectively 1*s.*, 8*d.*, 6*d.*, 4*d.*, 3*d.*, 2*d.*, $1\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, and $\frac{1}{2}$*d.*; whilst the same sum represented by 100 mils is not divisible into a third or an eighth part, or any of their subdivisions.

The same may be said again of the shilling, which, represented by 12 pence, or 48 farthings, may be divided by 2, 3, 4, 6, 8, 12, 16, 24, giving respectively the sums 6*d.*, 4*d.*, 3*d.*, 2*d.*, $1\frac{1}{2}$*d.*, 1*d.*, $\frac{3}{4}$*d.*, $\frac{1}{2}$*d.*; whilst

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the same shilling, represented by 50 mils, is divisible only by 2, 5, and 25, giving the sum 25 mils, 5 mils, and 2 mils.

Now let us compare the three systems with reference to the number of figures requisite for stating the fractions of a £ which are obtainable under each of the three systems :—

£		s. d.		Pence.		Mils.
1	=	20 0	=	240	=	1000
$\frac{1}{2}$	=	10 0	=	120	=	550
$\frac{1}{4}$	=	5 0	=	60	=	200
$\frac{1}{5}$	=	4 0	=	48	=	200
$\frac{1}{8}$	=	2 6	=	30	=	125
$\frac{1}{10}$	=	2 0	=	24	=	100
$\frac{1}{20}$	=	1 0	=	12	=	50
		2 4 6		544		2,225
		19 figures.		19 figures.		25 figures.

ANSWER.

15. The 1000 mils can be divided a thousand times without a remainder. They afford a thousand gradations of price.

The 960 farthings can be divided 960 times without a remainder, and afford 960 gradations of price.

The 240 pence can be divided 240 times without a remainder, and afford 240 gradations of price.

OBSERVATIONS.

15. More repetitions of the fallacy that 1000 has 1000 divisors. What can be meant by calling the instances in Question 15 garbled? They exhaust all the possible cases comprised within certain limits.

Of these gradations of price there are the following in the respective categories divisible by the prime numbers without a remainder :—

Number of Prices which may be divided by	In the Mils.	In the Farthings.	In the Pence.
2	500	480	120
3	333	320	80
4	250	240	60
5	200	192	48
6	166	160	40
7	142	137	34
8	125	120	30
9	111	106	26
10	100	96	24
	1927	1851	462

All these prices and their divisions can be more easily paid by the mil system, more easily recorded, more easily dealt with by any arithmetical rule, and have this great advantage over all irregular quantities,—one which never for a moment ought to be lost sight of,—that they yield a per-centage without any arithmetical operation.

These considerations comprehend every objection which can be founded upon the non-divisibility of the integer.

The integer is but one price, and not a frequent one, of anything divisible ; and when that is said, there ought to be nothing more needed.

There is no force in No. 15. Its instances are garbled, and consequently worthless in the argument.

QUESTION.

18. At present our system of weights and measures, and our system of coins, may be considered as binary. Can it prove consistent with public convenience to abandon the binary, and to adopt the decimal system in our coinage, unless we have decided on the same course in our system of weights and measures ?

ANSWER.

18. We have no binary system in our coinage ; and I do not use the word here in a narrow or restricted sense. I maintain that it is not practically a binary system. In neither weights, measures, nor money can you arrive at the integer, either by a binary or a duodecimal division.

Take the most favourable to this view, the avoirdupois weight.

In the ton you cannot get down to the pound ; you cannot get lower than thirty-five pounds.

In the pound, which is your strongest point, you cannot reach the integer by any possible division. You can go eight stages down to the drachm. Let us see how that acts : 1 drachm at 960 farthings a pound $= {}^{1}/_{2}\,{}^{2}/_{3}$. So No. 18 starts with a fiction. See No. 10.

OBSERVATIONS.

18. This proves only that some cases of imperfect divisibility will occur in £ *s. d.* But the real question is, on which system do the manageable cases occur most frequently ? There can be no doubt as to the answer.

REV. P. T. OUVRY.

Rev. P. T. Ouvry.

QUESTION.

8. Is it not impossible under the decimal system, to break the integer into as many clear fractional parts as we now obtain under our present system of coins ? Do you not consider that this is an objection to the decimal system ?

ANSWER.

8. Ten has, no doubt, fewer divisors than twelve. I believe that our retail transactions are carried on by the multiplication of smaller integers, rather than the division of larger ones. Things cost so many pounds, or so many shillings, or so many pence, or so many farthings. Even when divisions of an integer are made, there is a tendency to give them a new integral name, rather than one showing the fraction of the larger integer. We prefer to say ten shillings rather than half a pound; and we never speak of a quarter pound—we say five shillings or a crown. So we say sixpence, or fourpence, or threepence, which are fractions of a shilling, but which are thought of as multiples of a penny. Even a halfpenny is more viewed as an integral coin than as half a penny; and a farthing is never thought of as a quarter penny. We should easily get into the habit of estimating values in pounds, florins, and cents; and I think they would be quite as convenient for all retail transactions as pounds, shillings, pence, and farthings.

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8. Mr. Ouvry, like all the decimalists, omits one important consideration—that the divisibility of the shilling helps multiplication as well as division. Thus it is easier to multiply 11*s.* 3*d.* (or $11\frac{1}{4}s.$, as it would be considered in head work) by any multiplier with binary factors than it would be to multiply 11*s.* 5*d.* by the same number (so much so, that the latter would be best treated as $11\frac{1}{4}s. + 2d.$). It is true we do not talk of half a pound, but if we have to work upon £1 10*s.*, we treat it mentally for most common calculations as $£1\frac{1}{2}$; and in the same way for mental calculation the 6*d.* is regarded as half a shilling.

Now, sums expressible by convenient fractions of the shilling must occur much oftener than sums expressible by like fractions of a florin, on account of the superior divisibility of 12 over 10. Hence, if it were more generally true than it is, that common reckonings were for the most part those of multiplication, the advantage of the divisibility of 12 would not be lost.

QUESTION.

9. In an old but very remarkable treatise on "Coin and Coinage," (Vaughan, 1675, this passage occurs:—

"Of all the numbers, 12 is the most proper for money, being the most clear from fractions and confusion of account, which ought not to be neglected, by reason that of all other numbers it is most divisible—being divisible into units, as all numbers are; into two parts, as no odd number is; into three parts, as no even number is but six, and the numbers that consist of sixes; into fourths, into which six is not divisible; and into sixths."

In the memoir dictated by Napoleon at St. Helena, on the new French system, is this passage:—

"On avait préféré le diviseur 12 au diviseur 10, parceque 10 n'a que deux facteurs 2 et 5, et que 12 en a quatre, savoir, 2, 3, 4, et 6. Il est vrai que la numération décimale, généralisée et exclusivement adaptée au mètre comme unité, donne des facilités aux astronomes et aux calculateurs; mais ces avantages sont loin de compenser l'inconvénient de rendre la pensée plus difficile. Le premier caractère de toute méthode doit être d'aider la conception et l'imagination, faciliter la mémoire, et donner plus de puissance à la pensée."

What validity is there in these considerations as objections to the introduction of a decimal system of coinage? Or in what does the fallacy of them consist?

ANSWER.

9. If simple arithmetic, founded on the number ten, be good for the astronomer and the computer, surely it is equally good for the people.

I do not see how the more numerous fractions of twelve than ten helps the customer and dealer; you use multiples of various integers rather than fractional parts.

The fallacy consists in the supposition that men make fractional parts of their money, instead of reckoning it.

OBSERVATIONS.

9. Several fallacies are involved in this answer—

1st. Simple arithmetic by tens is not abstractedly the best for the astronomer. Duodecimal arithmetic would be much better if it were not for the accumulation of tables in the present notation.

2nd. The astronomer works on paper with logarithmic and other tables. The people work in their heads. Simple arithmetic is best for the former, and £ *s. d.* arithmetic for the latter class of operations. Therefore the major premiss is false—viz., that what is good for the astronomer must be equally good for the people.

The fallacy noticed in reply to Question 8 is again repeated; I will not repeat my observation. There is no such fallacy as alleged in Napoleon's remarks. Divisibility of coins helps all mental money-reckoning, and not merely the making of fractional parts, though that itself is important.

QUESTION.

11. Is there not great force and truth in the remark of Napoleon, that a decimal system of dividing the integer and of expressing the fractional parts, must be less favourable to distinctness of conception, to facility of recollection, and to readiness and ease in mental calculation, than a binary, or than our present system.

ANSWER.

11. I think not; it is a matter of habit. When people become accustomed to simple arithmetic, for all purposes they will greatly prefer it.

OBSERVATIONS.

11. Here again, "simple arithmetic" is talked of as a mystery to which people are not yet accustomed. This is a very singular argument.

QUESTION.

14. In the following table compare the three systems—the present, the mil, and the penny system. With which does the superiority rest as regards,—

1. Number of figures used?
2. Conciseness of expression in words or in writing?
3. Facility for mental conception of the sum stated?
4. Tendency to promote accuracy in copying or calling over?
5. Facility for calculations, especially those which must be made in the head?
6. Interchangeability at equivalent value with the coins now in use?

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£	s.	d.		Mils.		Pence.
1	0	0	=	1000	=	240
0	17	8	=	883	=	212
0	15	6	=	775	=	186
0	9	9	=	487	=	177
0	6	3	=	312	=	75
0	5	7	=	279	=	67
0	4	10	=	241	=	58
0	3	8	=	183	=	44
0	2	4	=	112	=	28
0	1	5	=	70	=	17
4	7	0		4342		1044
27 figures.				34 figures.		28 figures.

If we now proceed to subject these total sums to division, which system will be found the most convenient? 4*l.* 7*s.*, divided by 3, 4, 6, and 12, gives the respective sums, 1*l.* 9*s.*, 1*l.* 1*s.* 9*d.*, 14*s.* 6*d.*, 7*s.* 3*d.*

Pence 1044, divided by 3, 4, 6, and 12, gives the respective sums of 348 pence, 261 pence, 174 pence, 87 pence.

But 4342 mils is not divisible without a remainder by any of these divisors.

ANSWER.

14. This would go to prove that compound arithmetic is easier than simple arithmetic; most people would prefer simple arithmetic.

OBSERVATIONS.

14. Mr. Ouvry is, no doubt, right in saying that the question would "go to prove that compound is easier than simple arithmetic" for mental reckoning; and the more the point is examined by the light of real examples, the more obvious will this truth become. "*Most people,*" *it is true, would say they preferred simple arithmetic, because they would think only of paper work. But they go far to prove that they prefer the other* (*consciously or unconsciously*) *in mental work, by always using methods which simple arithmetic would scarcely admit of.*

QUESTION.

38. Are not the following the primary requirements of a good system of coinage? viz.:—

1st. That the integer should be divisible into the greatest number of clean fractional parts to correspond with the endless variety of retail transactions which they are to be the means of adjusting:

2nd. That these fractional parts should be expressible in the shortest and most simple form of words, and with the smallest number of figures:

3rd. That the coins should be such, both in denomination and relative value, as may pass with the greatest facility in valuing or summing them up when presented in great numbers:

4th. That they should be such as may afford the greatest facility for mental conception, for recollection, and for the ordinary processes of arithmetic which the people are daily called upon to perform mentally in the tumult of the market or shop, and without the opportunity of recording them in writing:

5th. That they should harmonize with the natural tendency of mankind to subdivide commodities for retail purposes by continual halving.

ANSWER.

38. (4.) Mental arithmetic is independent of any particular system of coinage, I believe, and depends a good deal on a number of standard results of calculation being stored in the memory like an extended multiplication table. Whether a decimal system is preferable or not on this ground, I do not know.

OBSERVATIONS.

38. (4.) This opinion explains a good many of Mr. Ouvry's other replies. If he thinks that mental arithmetic is independent of any particular system of coinage, it can only be because he is not in the habit of using it much himself, and has not inquired into the methods by which ordinary retail reckonings are worked. But I have already pointed out, over and over again, how our mental arithmetic depends on the divisibility of the shilling and other coins.

QUESTION.

47. The fractions of a penny would be written as fractions, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. Is this a disadvantage? Is it not the case, that practically in all countries, even in those in which the decimal system is most completely carried out, the ultimate subdivision of coins is binary? Is not this shown by the fact that in France, Portugal, &c., the 5-centime piece and the 5-rei piece are the lowest coins in general use, or generally expressed in accounts? In the United States is not a $\frac{1}{2}$ cent universally expressed instead of 5 mils? What is the inconvenience of writing such values as fractions? Are they not as easily added in this as in a decimal form, and are they not more easily multiplied?

ANSWER.

47. I think it is inconvenient to write fractions; but it certainly is not inconsistent with a decimal coinage that some persons should choose to use in their accounts a binary division of the lowest integer.

OBSERVATIONS.

47. *It may be inconvenient to write fractions, but it is generally much more convenient to think in them, and work with them, than with the corresponding decimals. This is the root of the whole matter. Every one who has to multiply* 1*s.* 6*d.* or 1*s.* 3*d.* *mentally by an even number, and indeed in most other cases, treats them as a shilling and a half and a shilling and a quarter.*

J. Paterson.

J. PATERSON.

QUESTION.

36. In the Report of the Legislative Assembly of Canada, on Decimal Currency (p. 14), is the following statement:—

"The decimal currency admits of but one aliquot division—into halves—but the New York shilling, an eighth of a dollar, can be divided into sixths, quarters, thirds, halves, &c.; and although Congress has

never coined any shillings, the American people during sixty years have clung to their well-worn shillings and sixpences, perceiving them to be of great public convenience. Your Committee are of opinion that coins representing the eighth and sixteenth of a dollar are indispensable in small transactions in Canada, and that the smooth British sixpences will continue to pass extensively as the eighth of a dollar, unless a better coinage is provided." J. PATERSON.

In a communication from the Rev. Joshua Leavitt, of New York (p. 48 of the same Report), this further remark occurs :—

"I have no doubt of the superiority of the decimal system for the purposes of accounts, and am astonished that other countries have so long delayed its adoption. Our experience of the benefit of our federal currency in this respect is all one way. The saving of time and labour is prodigious, and the advantage in point of correctness and of the facility of detecting errors unquestionable. But for the purposes of small circulation, in marketing, huckstering, and the like, I am persuaded that a duodecimal currency like that of England, or like that which formerly prevailed in the city of New York, is far preferable. These small transactions of daily life outnumber the transactions of commerce almost infinitely. And it seems impossible to make a decimal currency as convenient in these as the old currency. One reason is, that the decimal currency admits of only one aliquot division—that is, into halves. The shilling can be divided into halves, quarters, thirds, sixths, and twelfths ; and if it were needed, a coin of the value of two-thirds of a shilling would be found manageable. In all these countless small transactions which I have referred to, and in which every man is employed many times every day, this capability of subdivision is of great convenience. We are constantly buying a half of a thing, or a quarter, the eighth, the one-third, and so on. If the price is a dollar, we can make the change for one half, for one quarter, and if one, two, or more pence, with our decimal currency ; but we cannot pay the exact price of one third, one sixth, one eighth, one twelfth, or any other of the fractional parts. If the price is half a dollar, we can only pay for one half, one fifth, and one tenth. If the price is a quarter of a dollar, we can pay for no aliquot division whatever. This is a constant inconvenience, and can be got along with in no other way than by *disregarding small differences.*"

If a decimal coinage be introduced into this country, is there any reason to suppose that the inconveniences here stated as the result of practical experience in the United States will not equally occur in this country ?

Will it be possible to obtain the eighth or the sixteenth of a florin, or the quarter of a shilling, or the half of a sixpence, under the proposed decimal system ?

If the *small differences* necessarily arising from this imperfect divisibility of the decimal coins must be *disregarded*, upon whom would the unavoidable loss fall ?

With the tradesman will it not be an accumulating loss, consuming his profits ? and will it not be impossible, therefore, for him to bear it ?

Must it not therefore necessarily fall upon the small purchaser ?

The principle of the objection is, that the decimal system substitutes the divisors 2 and 5 for the divisors 2, 3, 4, 8, 12, 16, which are the natural divisors for material things, and are also the divisors of our present money, giving us the third, fourth, and half parts of everything.

That the effect of this will be, in the sale of broken parcels of commodities, a small money remainder involving loss to shopkeeper or customer.

This, we see, is a source of constant inconvenience in the United States.

Let us take the descending steps from 8*s.*

8*s.*, or 400 mils, or 4 florins, is not divisible by 32, the divisor of $\frac{1}{2}$ oz.

4*s.*, or 200 mils, or 2 florins, is not divisible by 16, the divisor of 1 oz.

2*s.*, or 100 mils, or 1 florin, is not divisible by 8, the divisor of 2 oz.

1*s.*, or 50 mils, or $\frac{1}{2}$ florin, is not divisible by 4, the divisor of $\frac{1}{4}$ lb.

6*d.*, or 25 mils, is not divisible by 2, the divisor of $\frac{1}{2}$ lb.

In each of these cases, in the purchase of a broken quantity of material, $\frac{1}{2}$ oz., 1 oz., $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., will there not necessarily arise a broken sum of money, which cannot be paid in any coin ; a small "difference which must be disregarded," to the loss of buyer or seller ?

Mark how under a decimal coinage the difficulty occurs in an earlier stage, and in a more serious form, than under the present coinage, precisely as we descend to the lower amounts, to those which are the usual prevalent prices with the middle and lower classes.

If it be assumed that, instead of these prices, "competition will determine prices in decimals conveniently divisible by 2, 4, 8, or 16," and therefore in prices not corresponding to the decimal money of account ; if instead of one shilling, or 50 mils, the price of the unit of the material is taken at 48 mils, is not this in itself an admission that in introducing decimal money we shall have introduced a money not conveniently adapted to the purposes of the market ?

And in so doing shall we not have incurred a new set of objections, namely, the inconvenience of being obliged to use several coins with which to pay the 48 mils, instead of one coin with which 50 mils may be paid ?

ANSWER.

36. After reading this long paragraph, suppose a customer to call for the third of a pound of tea, at 7*s.* 7*d.* the lb., what quantity shall the grocer weigh out ? and what shall the customer pay for it ? The weight must be 5 ozs. and $5\frac{1}{3}$ drachms, which costs two shillings and sixpence and $1\frac{1}{3}$ farthing, and there exists neither weights nor coins capable to consummate this simple transaction. Or take a yet simpler case, which might readily be supposed to occur :—One-third of a pound of sugar is required, at the rate of fivepence per pound,—it costs one penny and $2\frac{2}{3}$ farthings. If similar applications are not frequent, nor even occasional, it is a proof that, notwithstanding the use of the duodecimal system of coinage, third parts of any units whatever of weight or measure are not in demand in this community.

OBSERVATIONS.

36. It is, no doubt, true that ternary subdivisions are of little importance compared with binary ones ; and for that reason I have generally used 2, 4, 8, 16, as the divisors by which to try the examples proposed by the different witnesses, and the results have not been unfavourable to £ *s. d.*

Mr. Paterson may or may not be right in saying that a customer *ought not* to demand one ounce for $\frac{1}{16}$th of the price of a pound ; nevertheless, he not only does demand it, but gets it. (See App. I., pp. 165, 166).

The ternary partition of quantity not being required for convenience, the difficulty of adjusting integral quantities of payments falls wholly upon binary subdivisions. Now, upon the fundamental principle that

Dr. PEACOCK.

weights and measures. This anomaly was severely felt in the United States; and to obviate the inconvenience Spanish pieces of $6\frac{1}{4}$ and $12\frac{1}{2}$ cents, although illegal coins, were of necessity employed."

Must the truth and force of this statement be admitted, or, if not, what answer can be given to it?

ANSWER.

23. The processes of trade will readily adjust themselves to the coinage, and when it is found not to be convenient to proceed by division, tradesmen will proceed by multiplication. It is strange to find Mr. Yates arguing against the decimal system when he is advocating the adoption of the French system of coins, weights, and measures, *in toto*. The argument, if true affects a small part of the subject only.

OBSERVATIONS.

23. If tradesmen should proceed as this answer suggests, the labour of their calculations would be increased by the change.

Again, if Mr. Yates's argument is true, how can it be said that the facility of the computations which "working men have to use in making their purchases," affects a small part of the subject only? Consider their numbers.

QUESTION.

34. Is it not the fact that in all matters of abstract number and multiplication of material things there appears to be a general instinctive tendency to adopt the decimal system, whilst in dealing with material subdivision whether in length, capacity, or weight, there is an equally strong tendency to adopt the binary system—the decimal system in arithmetical calculation, the binary system in weights and measures, and the retail transactions of the market arising out of them? Are not all the integers of our weights and measures multiplied decimally, but divided by the binary scale? Do we not speak of ten yards, a hundred yards, a thousand yards? But when we come to *subdivide* the yard, do we not think and speak of half a yard, quarter of a yard, &c., and similarly in all other cases?

"The earliest and most venerable of historical records extant, in perfect coincidence with speculative theory, prove that decimal arithmetic, as founded in nature, is peculiarly applicable to the standard *units* of weights and measures, but not to their subdivisions or fractional parts, nor to the objects of admeasurement or weights." QUINCY ADAMS'S *Report to Senate of United States*, 1821, p. 16.

ANSWER.

34. It is this departure from the decimal scale in the subdivision of our primary units, which produces all the intricacies of our arithmetic. It is somewhat against the views advanced in this No., that our railway surveyors and engineers generally divide their measuring staffs into decimals; surveyors of lands, with the chain, proceed by the decimal scale, and then reduce the results to the barbarous scale of acres, roods, and perches; and our foot rules are now divided decimally as well as duodecimally. Are not these facts proofs of a growing desire amongst practical men to emancipate themselves from our metrical system?

OBSERVATIONS.

34. This is the same argument as in Ans. 19, and it is sound only *quâ* paper calculation, to which alone the writer seems to have referred. There is, no doubt, some desire for emancipation in the higher ranks of calculators, and the desire is very easily gratified by each man for himself, without any change in any part of our metrical system. The reference to the habits of engineers is a proof of this.

QUESTION.

35. Is it not then natural and convenient that our integer of money, the £ sterling, should be similarly treated? That whilst we speak of ten pounds, one hundred pounds, one thousand pounds, we should *subdivide* the £ sterling into half a pound, or 10*s.*; a quarter of a pound, or 5*s.*? And again that we should subdivide a shilling into half a shilling, or 6*d.*; a quarter of a shilling, or 3*d.*, and so on?—thus applying decimal arithmetic to the standard unit of our coinage, the £ sterling, but not to its subdivisions or fractional parts.

ANSWER.

35. Why require us to do that in the first instance which we must not do in every important arithmetical process; in the arbitration of exchanges, and in almost every transaction of life?

OBSERVATIONS.

35. It is not the individually important processes which are most important in the aggregate, but those processes which are used every day by the bulk of the people.

QUESTION.

36. In the Report of the Legislative Assembly of Canada, on Decimal Currency (p. 14), is the following statement:—

"The decimal currency admits of but one aliquot division—into halves; but the New York shilling, an eighth of a dollar, can be divided into sixths, quarters, thirds, halves, &c., and although Congress has never coined any shillings, the American people during sixty years have clung to their well-worn shilings and sixpences, perceiving them to be a great public convenience. Your Committee are of opinion that coins representing the eighth and sixteenth of a dollar are indispensable in small transactions in Canada, and that the smooth British sixpences will continue to pass extensively as the eighth of a dollar, unless a better coinage is provided."

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make the change for one half, for one quarter, and if one, two, or more pence, with our decimal currency; but we cannot pay the exact price of one-third, one-sixth, one-eighth, one-twelfth, or any other of the fractional parts. If the price is half a dollar, we can only pay for one-half, one-fifth, and one tenth. If the price is a quarter of a dollar, we can pay for no aliquot division whatever. This is a constant inconvenience, and can be got along with in no other way than by *disregarding small differences.*" Dr. Peacock.

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And in so doing shall we not have incurred a new set of objections, namely the inconvenience of being obliged to use several coins with which to pay 48 mils, instead of one coin with which 50 mils may be paid?

ANSWER.

36. Wherever the decimal system of coinage has been introduced it has taken root almost immediately, and superseded the ancient coins both in accounts and trading transactions. The case was somewhat different with the French metrical system in the first instance, as no sufficient care was taken, in the troubles of the Revolution, to supersede the old measures, and to replace them by the new ones. The Bourbons, on their return, in conformity with their reactionary system sanctioned the continuance of the old by the side of the new system. I believe that after the revolution in 1830 the decimal system was introduced, to the exclusion of all others. The same system prevails universally in Belgium.

Is this conclusion confirmed by recent experience in America? No attempt has been made there to introduce a decimal metrical system.

If we consider the rough mode in which the prices of small portions of commodities are estimated no apprehensions need be entertained. A very short experience would be sufficient for their adjustment. We may be quite certain that the loss and gain will be pretty equally distributed.

Has any such difficulty ever occurred in France?

Prices of such articles will be estimated in mils and its multiples, as they are by cents in France and America. They proceed by the ascending and not the descending scale.

Altogether unfounded.

OBSERVATIONS.

36. The facts in this answer are rather strongly stated. If we are to believe some witnesses, shillings and sixpences still survive in America. Sous will not give way in France, and the coinage in Belgium is in a state of great confusion. However, if the observation is understood as referring to accounts and large trading operations, as distinguished from "huckstering transactions," it is probably accurate enough.

I agree that the question of the loss and gain is not the most important, but the mode of reckoning in such small dealings is the first consideration, and it is there where the superiority of £ *s. d.* is conspicuous.

QUESTION.

38. Are not the following the primary requirements of a good system of coinage? viz.:—

1st. That the integer should be divisible into the greatest number of clean fractional parts to correspond with the endless variety of retail transactions which they are to be the means of adjusting:

2nd. That these fractional parts should be expressible in the shortest and most simple form of words, and with the smallest number of figures:

3rd. That the coins should be such, both in denomination and relative value, as may pass with the greatest facility in valuing or summing them up when presented in great numbers:

4th. That they should be such as may afford the greatest facility for mental conception, for recollection, and for the ordinary processes of arithmetic which the people are daily called upon to perform mentally in the tumult of the market or shop, and without the opportunity of recording them in writing:

5th. That they should harmonize with the natural tendency of mankind to subdivide commodities for retail purposes by continual halving.

Dr. Peacock.

ANSWER.

38. Which is considered as the integer or primary unit, the pound, the shilling, or the penny ?

No system in this respect can be comparable to the decimal : it requires no reductions.

Is the present system comparable, in nearly all these particulars, to the decimal, clearness of conception included ?

The tendency to multiply is at least as natural as that to divide, whilst the process of multiplication is made easier.

OBSERVATIONS.

38. Multiplication and division must both be frequent in any case ; but mental multiplication is not, I think, made easier by decimals, but exactly the reverse. Examples are the only tests of this, and I have already discussed those which have been proposed by the decimalists.

QUESTION.

41. If, in place of our present division of the £ sterling, a decimal division be substituted, shall we not in many cases lose the power of obtaining an exact result ?

What is the 3rd, the 6th, the 12th, or the 16th part of a £ sterling under decimal division of the coinage ?

Under our present system it is exactly 6*s.* 8*d.*, 3*s.* 4*d.*, 1*s.* 8*d.*, 1*s.* 3*d.*

Again : what is the 3rd, 6th, 12th, and 16th part of a shilling in decimal coinage ?

Under our present system it is exactly 4*d.*, 2*d.*, 1*d.*, 3 farthings.

ANSWER.

41. The multiples of the mil between 1 and 1,000 afford every variety of intermediate value which the business of commerce or trade can require. In all these numbers it is the same issue which is involved —division against multiplication. Which is the easiest ?

OBSERVATIONS.

41. The question of Division *v.* Multiplication is not the real issue ; but if it were, it would be difficult to show that the multiplication of the large numbers involved in the use of mils would not be more difficult than the fractional handling of the present coinage.

QUESTION.

If it be admitted that for all ordinary retail transactions, for the purposes generally of paying and receiving, our present coinage is satisfactory, whilst the inconvenience is found to arise when we come to processes of account keeping and calculation, does it not follow that our present coins ought, if possible, to be retained without any change, that some decimal system of *recording* the various sums should be introduced, and that we should decimalize our *Accounts*, retaining our present *Coinage* in all respects unchanged ?—See No. 37.

ANSWER.

42. This is impossible. The Government may require their accounts to be decimalized, and contracts to be drawn up in decimals ; but without a Decimal Coinage the reductions which must precede accounts in the ordinary transactions of life would be perfectly intolerable.

OBSERVATIONS.

42. Experience runs counter to this opinion. See Mr. Finlayson's evidence.

QUESTION.

61. Is it not a serious objection to the proposed scheme that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of everything which they require, and to the use of which they are well accustomed ; whilst, on the other hand, it will give them the divisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use ?

" A glance of the eye is sufficient to divide material substances into successive halves, fourths, eighths, and sixteenths. A slight attention will give thirds, sixths, and twelfths. But divisions of fifth and tenth parts are among the most difficult that can be performed without the aid of calculation. Among all its conveniences, the decimal division has the great disadvantage of being itself divisible only by the numbers two and five. The duodecimal division, divisible by two, three, four, and six, would offer so many advantages over it, that while the French theory was in contemplation, the question was discussed, whether the reformation of weights and measures should not be extended to the system of arithmetic itself, and whether the number twelve should not be substituted for ten as the term of the periodical return to the unit."—Quincy Adams's *Report*, p. 71.

ANSWER.

61. A duodecimal arithmetic would have many recommendations ; but who would propose it ?

OBSERVATIONS.

61. The implied condemnation of duodecimal arithmetic as an enforced system may be right enough, but there might be a duodecimal metrical system without compulsory duodecimal arithmetic. If there were, duodecimal arithmetic would be extensively used, if we may draw any inference from the fact that it is used now in solid measurement ?

QUESTION.

65. Looking to the considerations alluded to in the preceding questions, the superior facility of division possessed by 12, the further very convenient and almost unlimited facility of division arising from our peculiar mode of reckoning the £ integer into shillings, pence, and farthings ; the harmony which exists between our fractional coins and our weights and measures, the doubtful advantages in facility of calculation to be obtained from decimal coins unaccompanied by decimal weights and measures, and the brevity and convenience of expression, oral and written, which attaches to our present coins ;—duly weighing, on the other hand, the advantage of assimilating the progression of coins to that of figures, the simplicity and facility in keeping accounts and making calculations, the saving of time in education and of labour by the substitution of simple for the proverbial inconvenience of compound arithmetic, which it is expected will arise from the introduction of decimal coinage :—

Is it on the whole prudent to make the experiment ? Is the result sufficiently certain ? Will the increase of convenience be sufficiently great and fairly diffused over all the classes upon which the inconvenience of

the change must fall? Or must we come to the conclusion that the advantage of the change is neither so important nor so well ascertained as to justify the disturbance of our existing system, and of the habits and computations founded upon it? Dr. Peacock.

ANSWER.

65. This query seems to admit the general advantages of a decimal coinage. Many of those advantages are quite independent of a decimal metrical system, though much increased if combined with it.

The proverbial inconvenience of compound arithmetic is here referred to. This most especially affects the education of the lower orders, and of many of the upper. A great proportion of schoolboys are never able to conquer it; and those who do so must devote rarely less than a year to a study which unduly burdens the memory, and which, by diverting the mind from the higher departments of decimal arithmetic—decimals, as usually called—puts a stop, not merely to the use of logarithmic tables, but to all the higher applications of mathematics. It is well known that French boys advance much farther in arithmetic and its applications, after the same length of study. This is in a great measure owing to their admirable decimal system. Why are tables of logarithms so rarely seen or used in our counting-houses?

I believe the adoption of the decimal system, if once fairly undertaken by the Government, to be certain and inevitable. There is no example of its failure where proper precautions were taken to introduce a sufficiency of the new coins, and to withdraw the old coins which were incommensurable with them; and it is now rapidly extending to every part of Europe.

I see no advantage likely to result from the further ventilation of the question. There is no doubt that 19-20ths of those persons who have really studied the subject are in favour of its adoption, and very little impression is ever likely to be made upon the remainder.

I think Lord Overstone has done full justice to his well-known acuteness and ability in his pleadings in favour of our existing coinage; but it is sufficiently singular that nearly all those elaborate and carefully worked out arguments resolve themselves into so few which really merit consideration; or rather, if we assume that the decimal system is once introduced and adopted, there is only one which remains, and that is, the want of a sufficient number of binary subdivisions in decimal coins; he seems, however, to have ignored the rapid change of habits which a change of the coinage would introduce. If convenient subdivisions were wanting in our coins, tradesmen and others would reverse their order of proceeding, adopting generally multiples of an inferior unit instead of subdivisions of a higher. They would proceed from mils to shillings, and not from shillings to mils; from ounces to pounds, and not from pounds to ounces.

I do not believe there is any sufficient reason to delay the adoption of this measure. It has already been sufficiently discussed, and it is not likely that the public generally will ever be better prepared for it than they are at present. A preparation has already been professedly made for it in the introduction of the florin. The system is generally noticed in our new books of arithmetic. Examples in our better schools are given in illustration of it: it has been repeatedly and ably discussed at various public meetings, and it is well known that the opinion of an immense majority of those whose opinion is worth considering is in favour of it; what, therefore, is likely to be gained by delay?

OBSERVATIONS.

65. The proverbial inconvenience of compound arithmetic exists only with reference to paper work. If the proverb means more, it is wrong.

Can it be right to say that the subject has been sufficiently ventilated when the most important question of all, whether the change would or would not impede the common mental reckoning of the market and the shop, has scarcely been entertained, and certainly not concluded, by the advocates of a decimal coinage?

The objections made in the interest of the lower classes are, I believe, justified; and the more so, because their especial subject—mental arithmetic—the weak point of the decimalists, has been hitherto kept in the background.

J. B. SMITH, M.P.—J. R. SNOWDEN. J. B. Smith, M.P.—J. R. Snowden.

OBSERVATION.

There is very little reference to the branch of the subject which I am considering to be found in these papers.

J. YATES. J. Yates.

QUESTION.

6. Is not the coinage chiefly concerned in the process of buying and selling by retail? and must not the question of the merit or demerit of any system of coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments? Are you aware of any complaint against our present system of coins in this respect?

Is not *the use of the coinage*—that is, the fitness of the coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small payments which arise—the consideration of primary importance, rather than the improvement of a system of account keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

ANSWER.

6. Certainly. The coinage is chiefly concerned in buying and selling by retail. A good coinage ought to enable us to "adjust with readiness and simplicity the multiplied variety of small payments;" but our present system of coins does not accomplish this object. The division of the coins by 20, 12, and 4 is inconvenient, and is consequently very much avoided in practice. In retail transactions the use of the pound is generally rejected, reckonings and statements of prices being made in shillings and pence, even when the value exceeds that of a pound. In proof of this, set out to walk from Tyburn-gate along

OBSERVATIONS.

6. The want of exactitude is an evil common to all systems, and one which would be more frequent with a decimal coinage than it is now. The mythical Mr. Crick's desire for smaller coins is imaginary. People refused to use half-farthings when they were issued. At any rate, you can go down lower with the present coinage, if necessary, and the argument tells more against the pound and mil scheme than any other.

Dr. Peacock.

ANSWER.

38. Which is considered as the integer or primary unit, the pound, the shilling, or the penny ?

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Is the present system comparable, in nearly all these particulars, to the decimal, clearness of conception included ?

The tendency to multiply is at least as natural as that to divide, whilst the process of multiplication is made easier.

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41. If, in place of our present division of the £ sterling, a decimal division be substituted, shall we not in many cases lose the power of obtaining an exact result ?

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ANSWER.

42. This is impossible. The Government may require their accounts to be decimalized, and contracts to be drawn up in decimals ; but without a Decimal Coinage the reductions which must precede accounts in the ordinary transactions of life would be perfectly intolerable.

OBSERVATIONS.

42. Experience runs counter to this opinion. See Mr. Finlayson's evidence.

QUESTION.

61. Is it not a serious objection to the proposed scheme that it will deprive the lower classes of their divisors 2, 3, 4, 8, and 16, as applicable to the coins most familiar to them, thus interfering with the facility with which they now obtain the third and fourth parts of everything which they require, and to the use of which they are well accustomed ; whilst, on the other hand, it will give them the divisor 5, which is wholly useless as a divisor of the commodities which they purchase, or of the money which they use ?

" A glance of the eye is sufficient to divide material substances into successive halves, fourths, eighths, and sixteenths. A slight attention will give thirds, sixths, and twelfths. But divisions of fifth and tenth parts are among the most difficult that can be performed without the aid of calculation. Among all its conveniences, the decimal division has the great disadvantage of being itself divisible only by the numbers two and five. The duodecimal division, divisible by two, three, four, and six, would offer so many advantages over it, that while the French theory was in contemplation, the question was discussed, whether the reformation of weights and measures should not be extended to the system of arithmetic itself, and whether the number twelve should not be substituted for ten as the term of the periodical return to the unit."—Quincy Adams's *Report*, p. 71.

ANSWER.

61. A duodecimal arithmetic would have many recommendations ; but who would propose it ?

OBSERVATIONS.

61. The implied condemnation of duodecimal arithmetic as an enforced system may be right enough, but there might be a duodecimal metrical system without compulsory duodecimal arithmetic. If there were, duodecimal arithmetic would be extensively used, if we may draw any inference from the fact that it is used now in solid measurement ?

QUESTION.

65. Looking to the considerations alluded to in the preceding questions, the superior facility of division possessed by 12, the further very convenient and almost unlimited facility of division arising from our peculiar mode of reckoning the £ integer into shillings, pence, and farthings ; the harmony which exists between our fractional coins and our weights and measures, the doubtful advantages in facility of calculation to be obtained from decimal coins unaccompanied by decimal weights and measures, and the brevity and convenience of expression, oral and written, which attaches to our present coins ;—duly weighing, on the other hand, the advantage of assimilating the progression of coins to that of figures, the simplicity and facility in keeping accounts and making calculations, the saving of time in education and of labour by the substitution of simple for the proverbial inconvenience of compound arithmetic, which it is expected will arise from the introduction of decimal coinage :—

Is it on the whole prudent to make the experiment ? Is the result sufficiently certain ? Will the increase of convenience be sufficiently great and fairly diffused over all the classes upon which the inconvenience of

the change must fall? Or must we come to the conclusion that the advantage of the change is neither so important nor so well ascertained as to justify the disturbance of our existing system, and of the habits and computations founded upon it? Dr. Peacock.

ANSWER.

65. This query seems to admit the general advantages of a decimal coinage. Many of those advantages are quite independent of a decimal metrical system, though much increased if combined with it.

The proverbial inconvenience of compound arithmetic is here referred to. This most especially affects the education of the lower orders, and of many of the upper. A great proportion of schoolboys are never able to conquer it; and those who do so must devote rarely less than a year to a study which unduly burdens the memory, and which, by diverting the mind from the higher departments of decimal arithmetic—decimals, as usually called—puts a stop, not merely to the use of logarithmic tables, but to all the higher applications of mathematics. It is well known that French boys advance much farther in arithmetic and its applications, after the same length of study. This is in a great measure owing to their admirable decimal system. Why are tables of logarithms so rarely seen or used in our counting-houses?

I believe the adoption of the decimal system, if once fairly undertaken by the Government, to be certain and inevitable. There is no example of its failure where proper precautions were taken to introduce a sufficiency of the new coins, and to withdraw the old coins which were incommensurable with them; and it is now rapidly extending to every part of Europe.

I see no advantage likely to result from the further ventilation of the question. There is no doubt that 19-20ths of those persons who have really studied the subject are in favour of its adoption, and very little impression is ever likely to be made upon the remainder.

I think Lord Overstone has done full justice to his well-known acuteness and ability in his pleadings in favour of our existing coinage; but it is sufficiently singular that nearly all those elaborate and carefully worked out arguments resolve themselves into so few which really merit consideration; or rather, if we assume that the decimal system is once introduced and adopted, there is only one which remains, and that is, the want of a sufficient number of binary subdivisions in decimal coins; he seems, however, to have ignored the rapid change of habits which a change of the coinage would introduce. If convenient subdivisions were wanting in our coins, tradesmen and others would reverse their order of proceeding, adopting generally multiples of an inferior unit instead of subdivisions of a higher. They would proceed from mils to shillings, and not from shillings to mils; from ounces to pounds, and not from pounds to ounces.

I do not believe there is any sufficient reason to delay the adoption of this measure. It has already been sufficiently discussed, and it is not likely that the public generally will ever be better prepared for it than they are at present. A preparation has already been professedly made for it in the introduction of the florin. The system is generally noticed in our new books of arithmetic. Examples in our better schools are given in illustration of it: it has been repeatedly and ably discussed at various public meetings, and it is well known that the opinion of an immense majority of those whose opinion is worth considering is in favour of it; what, therefore, is likely to be gained by delay?

OBSERVATIONS.

65. The proverbial inconvenience of compound arithmetic exists only with reference to paper work. If the proverb means more, it is wrong.

Can it be right to say that the subject has been sufficiently ventilated when the most important question of all, whether the change would or would not impede the common mental reckoning of the market and the shop, has scarcely been entertained, and certainly not concluded, by the advocates of a decimal coinage?

The objections made in the interest of the lower classes are, I believe, justified; and the more so, because their especial subject—mental arithmetic—the weak point of the decimalists, has been hitherto kept in the background.

J. B. SMITH, M.P.—J. R. SNOWDEN.

J. B. Smith, M.P.—J. R. Snowden.

OBSERVATION.

There is very little reference to the branch of the subject which I am considering to be found in these papers.

J. YATES.

J. Yates.

QUESTION.

6. Is not the coinage chiefly concerned in the process of buying and selling by retail? and must not the question of the merit or demerit of any system of coinage be decided by its fitness or unfitness for adjusting with readiness and simplicity the multiplied variety of small payments? Are you aware of any complaint against our present system of coins in this respect?

Is not *the use of the coinage*—that is, the fitness of the coins to perform their proper purpose of facilitating the division and distribution of commodities in the retail markets, and adjusting the small payments which arise—the consideration of primary importance, rather than the improvement of a system of account keeping, by which the convenience of the affluent and educated classes, of those who keep large and extensive accounts, may be principally promoted?

ANSWER.

6. Certainly. The coinage is chiefly concerned in buying and selling by retail. A good coinage ought to enable us to "adjust with readiness and simplicity the multiplied variety of small payments;" but our present system of coins does not accomplish this object. The division of the coins by 20, 12, and 4 is inconvenient, and is consequently very much avoided in practice. In retail transactions the use of the pound is generally rejected, reckonings and statements of prices being made in shillings and pence, even when the value exceeds that of a pound. In proof of this, set out to walk from Tyburn-gate along

OBSERVATIONS.

6. The want of exactitude is an evil common to all systems, and one which would be more frequent with a decimal coinage than it is now. The mythical Mr. Crick's desire for smaller coins is imaginary. People refused to use half-farthings when they were issued. At any rate, you can go down lower with the present coinage, if necessary, and the argument tells more against the pound and mil scheme than any other.

J. YATES.

Oxford-street, Holborn, Newgate-street, Cheapside, Cornhill, and so on to the London Docks and Blackwall. Look at the prices of articles, as marked in shop windows; examine the printed and lithographed letters circulated by tradesmen; go into the shops and attend to the questions of the customers, and the answers of the shopmen; in short, use every possible way of learning whether the pound is a necessary denomination in these transactions. You will find that the pound is not mentioned or even thought of in ninety-nine cases out of a hundred. Nearly all the statements and computations, previously to the act of expressing them on paper, are by the use of shillings and pence. Having paid some attention to this matter, I have remarked, as the general result of my observations, that watchmakers, jewellers, and silversmiths, and, to a small extent, music-sellers and furniture dealers, use the pound, but no other trades, except that wine merchants use it for large quantities. They sell port at so many pounds and shillings per pipe, but at so many shillings and pence per dozen or per bottle; thus, the practice of retail traders seems to show that in general they find no advantage in the division by twenty. They find the gold sovereign convenient as a substitute for twenty shillings, but as a money of account they do better without it; and I believe they would find it easier and simpler to keep their accounts, if the pound were banished from the columns of their books. Here is a bill for two quarters of oats, expressed "as the Act directs," but it is manifest that the reduction to pounds is perfectly useless. Mr. Kent, if left to himself, prefers saying that the price of a quarter of oats is 35*s.*, not 1*l.* 15*s.*; he only reduces the amount of his bill, 70*s.*, to pounds, for the sake of complying with the method which law and custom prescribe in this country.

"Bought of GEORGE KENT, Highgate.

	£	*s.*	*d.*
2 qrs. oats, 35*s.* - - -	3	10	0"

So much for the higher denomination, the pound.

Let us now consider the lower,—viz., shillings, pence, and farthings. To judge of their adaptation to our requirements, I would propose a walk, as before, from Tyburn to Blackwall; and I will include in my inquiries, not only poor persons and those of thrifty habits, but also luxurious persons and fashionable ladies. Our present coinage does not enable them to get what they want, and to pay for it honestly; but in innumerable cases they must either take more of an article than they want, or pay for what they want more than its just price. They commonly practise the latter alternative. Suppose, for example, any one wishes to purchase as follows:—

	s.	*d.*		*s.*	*d.*
1 oz. of tea, at	3	6	per lb. - -	0	2⅜
2 „ coffee, at	1	7	„ - - -	0	2⅜
¼ lb. Scotch barley, at	0	2½	„ - - -	0	0⅝
1¼ yards of ribbon, at	0	7½	per yard - -	0	9⅜

The individual in question cannot fulfil his wishes by the employment of the coins now in use; for the half-farthings, though coined, cannot be obtained, certainly not without a loss by carriage and correspondence, which makes the use of them impracticable.

Besides the impossibility of paying for fractional quantities, as in the preceding examples, about 300 separate articles might be enumerated, which are manufactured so cheaply, that they might be sold in any quantities at the rate of 10 for a penny, or even a considerably greater number for a penny, and so as to yield at this low price a profit of at least 100 per cent. to the retail dealer. I believe the introduction of a coinage capable of being used in such cases would be a great blessing to the community, and would not only add immensely to the innocent enjoyments of the family circle, but would be very favourable to habits of sobriety, decency, and prudent economy. To explain my meaning, I will take the actual case of a poor, but decent and respectable family in Suffolk, only observing that similar examples might be produced by thousands from all parts of the United Kingdom.

"Weekly earnings and expenditure of the family of Robert Crick, a farm-labourer of Lavenham, Suffolk, as furnished by Mr. Scott, the Relieving Officer of the Union:—

INCOME.

Family.	Age	Earnings. *s.*	*d.*
Robert Crick - - - -	42	9	0
Wife - - - -	40	0	9
Boy - - - -	12	2	0
Boy - - - -	11	1	0
Boy - - - -	8	1	0
Girl - - - -	6		
Boy - - - -	4		
Total earnings - - - -		13	9

EXPENDITURE.

	s.	*d.*
Bread	9	0
Potatoes	1	0
Rent	1	2
Tea - - -	0	2
Sugar - - -	0	3½
Soap - - -	0	3
Blue - - -	0	0½
Thread, &c. - - -	0	2
Candles - - -	0	3
Salt - - -	0	0½
Coal and wood - - -	0	9
Butter - - - -	0	4½
Cheese - - - -	0	3
Total expenditure - - -	13	9"

We may suppose these individuals to experience the following or similar desires; with our present coinage they cannot hope to satisfy them, however proper and innocent, or even commendable. Robert Crick wants a brass-headed nail to hang a picture on the wall of his cottage: his wife wants starch, or soda, for her washing. The eldest boy wants to sow mustard and cress. The second wants a pen, an envelope, a sheet of paper, some ink, or a few wafers, to write a letter. The third wants a slate pencil. The girl wants hooks and eyes, a dozen of pins, a needle, a stay-lace, a fastening for her boots, or a little thread or tape. The youngest urchin wants paper or string, that he may fly a kite. For these, and many other purposes, a farthing

would be too great an expenditure; and it appears to me that a wise and humane legislation would provide for such cases in this country, as they are provided for in other countries.

In the Polytechnic Institution, Regent-street, there is a case, exhibiting a collection of articles which are adapted to be sold for a centime.

QUESTION.

12. *Ex. gr.* Which is the more easy for conception, for recollection, or for addition mentally?

s.	*d.*		Mils.		Pence.
7	6	=	375	=	90
2	6	=	125	=	30
1	3	=	62	=	15
0	9	=	37	=	9
12	0		599		144

Again: we at once know that the half of 7*s.* 6*d.* is 3*s.* 9*d.*; but what is the half of 375 mils?

The half of 2*s.* 6*d.* is 1*s.* 3*d.*; but what is the half of 2*s.* 6*d.* estimated decimally, *i.e.* 125 mils, &c. &c.?

Take another case. Any number of yards—7, 8, or 9 yards—at 1*s.*, 1*s.* 6*d.*, or 2*s.* 6*d.* per yard; or the same number of yards at 50 mils, 75 mils, and 125 mils per yard:

Which calculation will be made with the greater readiness and accuracy, mentally and in the open market?

Take half-a-crown—double it—treble it—halve it—divide it by 3—and add all these products together. Is not this easily done by any common person, in his head, without pen and ink or pencil, and in the midst of confusion?

But try the same process upon the same sum in decimal notation, namely, as 125 mils. Will the calculation be equally simple and easy?

Now try it in pence, namely, as 30 pence. Is it not obvious that the calculation again becomes perfectly simple and easy?

Again: Price's Patent Candles are advertised in 12 lb. boxes at 11 shillings each. Every one knows that this gives 11*d.* per lb. for the candles. But what will be the calculation taken decimally? 12 lb. boxes at 5·50 mils each; how much per lb.?

Again:

		s.	*d.*	Pence.	Mils.
1	yard or lb. =	2	6	= 30	= 124, for more easy calculation than 125 mils.
$\frac{1}{2}$	do. =	1	3	= 15	= 62.
$\frac{1}{3}$	do. =	0	10	= 10	= impossible.
$\frac{1}{4}$	do. =	0	$7\frac{1}{2}$	= $7\frac{1}{2}$	= 31.
$\frac{1}{6}$	do. =	0	5	= 5	= impossible.
$\frac{1}{8}$	do. =	0	$3\frac{3}{4}$	= $3\frac{3}{4}$	= impossible.
$\frac{1}{10}$	do. =	0	3	= 3	= impossible.
$\frac{1}{12}$	do. =	0	$2\frac{1}{2}$	= $2\frac{1}{2}$	= impossible.
$\frac{1}{15}$	do. =	0	2	= 2	= impossible.
$\frac{1}{24}$	do. =	0	$1\frac{1}{2}$	= $1\frac{1}{2}$	= impossible.
$\frac{1}{30}$	do. =	0	1	= 1	= impossible.

Now, consider the comparative convenience in making the necessary payments.

2*s.* 6*d.* is paid with one coin. How many coins will be required to pay 124 mils?

1*s.* 3*d.* is paid with two coins. How many coins will be required to pay 62 mils?

Is it not by cases of this kind that the relative convenience of different systems of coinage must be tested?

ANSWER.

12. Not approving of the pound and mil scheme, I take the liberty of translating these English sums into francs and centimes, and I think it will be obvious at a glance which system is more easy for conception, recollection, and addition mentally.

s.	*d.*		Pence.		Francs.
7	6	=	90	=	9
2	6	=	30	=	3
1	3	=	15	=	1·50
0	9	=	9	=	0·90
12	0		144		14·40

OBSERVATIONS.

12. The want of the divisor 3 is not, as Mr. Yates assumes, the only defect of 10. A much more serious one is that 2 enters to the first power only.

Also, to halve the figures in the last column is the work of a moment. The argument does not here require that any notice should be taken of the difference between 1*d.* and 10 centimes.

According to my view, as I have always objected to three places of decimals, the next question will be how to reckon 7, 8, or 9 yards, at 1 f. 50 c. or 2 f. 50 c.; and my answer would be, that it is far easier than the English method, and that this is proved by every day's experience in the market and everywhere else.

As to the next question. I admit that the metrical system fails in respect to the division by 3, its only weak point. (Respecting 3 as a divisor, see further observations in the answers to Questions 36, 37, 38.)

Price's Patent Candles, if we had the metrical system, would be advertised in 6 kilogramme boxes at 12 francs each, which gives 2 francs per kilogramme, as seen at a glance. I will endeavour, as before, to convert the next table into terms of the metrical system, and I think the advantage will be in favour of this system as regards ease, clearness, and simplicity:—

J. YATES.

1	metre or kilogramme	=	3	francs, payable in	2 coins.
$\frac{1}{2}$	„ „	=	1·50	„ „	2 „
$\frac{1}{3}$	„ „	=	1	„ „	1 „
$\frac{1}{4}$	„ „	=	·75	„ „	2 „
$\frac{1}{5}$	„ „	=	·60	„ „	2 „
$\frac{1}{6}$	„ „	=	·50	„ „	1 „
$\frac{1}{10}$	„ „	=	·30	„ „	2 „
$\frac{1}{12}$	„ „	=	·25	„ „	1 „
$\frac{1}{15}$	„ „	=	·20	„ „	1 „
$\frac{1}{20}$	„ „	=	·15	„ „	2 „
$\frac{1}{30}$	„ „	=	·10	„ „	1 „

The gradations are the same as in Lord Overstone's table, except that $\frac{1}{5}$ is inserted, and $\frac{1}{8}$ omitted. It will be found that the payments may be made with a smaller number of coins on this plan than on his Lordship's.

QUESTION.

19. If the retail transactions of the community originate in a system of weights and measures, by which the hundredweight is divided into 4 quarters, the quarter into 28 pounds, and the pound into 16 ounces; and in which again the lineal measure, the yard, is divided into 3 feet, and the foot into 12 inches; will a coinage, founded on the decimal principle of division, afford greater facility for the adjustment of such retail transactions than the coinage which now exists?

ANSWER.

19. A decimal coinage will be, under these circumstances, better adapted for calculations in regard to the coinage itself, or in adding and subtracting money, but not beyond this, for reckoning the sums due for goods in such retail transactions.

OBSERVATIONS.

19. Mr. Yates admits that a decimal coinage will not be an improvement for reckoning the sums due for goods in retail transactions. If this be so, it would be difficult to justify a change which would incommode 100 persons to accommodate one.

QUESTION.

63. Will not the advantage of the change be experienced, if at all, by the commercial and higher classes,—those who keep extensive accounts, and enter into large calculations,—and not by the lower classes, who usually employ the smaller coins, and are familiar principally with the penny and its multiples and subdivisions?

ANSWER.

63. The advantage of the decimal system to those who keep extensive accounts will be a saving of time and labour, with a greatly diminished liability to error; but it will also be a great advantage to the lower classes by the greater simplicity of calculation, and the circulation of a small coin like a centime.

OBSERVATIONS.

63. Remembering the above admission, this reply must be taken with much qualification. To make Mr. Yates agree with himself, we must suppose that he considers written calculations to be more important to the poor than mental ones, which must be a mistake.

As to the diminished liability to error anticipated from a decimal system, see Mr. Bennett's answers. I believe the monotony leads to more error than the little difficulties of the present system in dividing by 12 and 20. But this relates only to accounts, for it is not pretended that the liability to error in mental work would be diminished. It would unquestionably be increased by reason of the greater strain on the memory.

Observe, too, that Mr. Yates, like many others, does not consider any scheme but his own an improvement on £ *s. d.*, and especially condemns the pound and mil project.

Lord Overstone's concluding questions have reference to the pound and mil scheme, and to the schemes founded upon the penny and the half-penny, to all of which I object as very imperfect, and of small or doubtful advantage. If we are to introduce difficulties and temporary confusion, let us do it with a clear prospect of ultimate and important advantages.

I have written the preceding replies under an impression that it was my duty to answer his Lordship according to the best of my ability. If he expresses "great diffidence," how much more do modesty and caution become an humble inquirer like myself. I think the British public are under great obligations to his Lordship, and, so far as I have the means of judging, to his colleagues, for the great care and attention which they have bestowed upon this difficult and laborious inquiry; and if their views are perhaps less comprehensive than might have been desired, I presume that this may be ascribed to the limited nature of their Commission.

NOTE.—Since the above analysis was prepared answers have been sent in by Mr. Alexander, of Baltimore, by Sir Chas. Pasley and by Mr. Rathbone. Mr. Alexander's answers enter slightly into the subject of mental calculation, but raise no questions which have not already been discussed. Mr. Rathbone's paper is an argument that the penny scheme is the legitimate conclusion from Lord Overstone's inferences. Sir Chas. Pasley's paper is chiefly remarkable for the reiterated opinions that the decimal system is susceptible of infinitely greater divisibility than the £ *s. d.* system, and that the fractions $\frac{9}{10}$, $\frac{8}{10}$, $\frac{7}{10}$, $\frac{6}{10}$, $\frac{5}{10}$, $\frac{4}{10}$, $\frac{3}{10}$, $\frac{2}{10}$, and $\frac{1}{10}$, are more useful than and afford as much facility for mental conception as the fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{12}$.

II.—*Answers of Witnesses opposed to Decimalization.*

Agreeing as I do with the substance of these replies, I shall not have many comments to offer on them, and shall confine myself for the most part to pointing out, for the convenience of those who wish to study the evidence, the special topics on which the different witnesses have insisted.

G. ARBUTHNOT.

G. ARBUTHNOT.

Mr. Arbuthnot is scarcely to be classed with the supporters or opponents of a decimal coinage, although he appears decidedly to object to the pound and mil scheme.

In the replies (8—11), Mr. Arbuthnot recognises the superiority of our present coinage for small retail transactions, but prefers decimals even for mental operations on large sums. It is not very material to inquire whether this latter opinion be correct or not, because, as a matter of fact, *small* retail reckonings supply almost all the occasions in actual life for mental computations. Few persons can deal with large sums in the head on any system, and scarcely any ever require to do so. G. Arbuthnot.

J. J. BENNETT. J. J. Bennett.

This witness, whose authority upon the subject of mental calculation is as high as any man's, has discussed the subject of mental arithmetic in the fullest and most convincing manner. Every word of his answers deserves to be carefully considered; and it will be very difficult for any antagonist to answer the reasonings contained in the paper. The main points on which he insists are the inapplicability of decimals to mental calculation in the market or over the counter; the abstract superiority of duodecimals; the tendency to error, even in account keeping, which is produced by the monotony of decimal work; and the violence of the wrench which the proposed change would give to the habits of the poor. With respect to mental calculations, see the Answers (3—16, 34—41, 50—57); and as to the evils of a transitional kind, the reply (64—65) appears unanswerable. But the paper is too much to the purpose to bear condensing, which I shall not presume to attempt, and it is enough to note it down in my catalogue as one which must be studied by all who would form a rational opinion on the subject.

S. A. GODDARD. S.A. Goddard.

In the replies 12 *f.* (p. 70), 20 *a.* (p. 71), 36 *b.* (p. 73), Mr. Goddard mentions the remarkable fact that, in spite of their decimal coinage, now 60 years old, Americans still use the shilling and sixpence as the means of performing the small reckonings which are worked in shops.

64*a.* An unequivocal opinion as to the superiority of the present coinage, so far as regards the convenience of the mass of the people.

The following is Mr. Goddard's summary of the conclusions at which he has arrived:

"It is settled conclusively in my mind—I have not the shadow of a lingering doubt on the subject,—1st, that decimal currency is not wanted for daily transactions; 2nd, that with our present shillings and pennies, dozens and grosses, &c., and duodecimal system, no decimal money would ever, even in generations, be adopted by the people; 3rd, that it would not be so convenient by far as the present system, even were all weights, measures, modes of computing by tens, &c., adopted; and therefore all that is wanted is a decimal money for accounts."

DR. GRAY. Dr. Gray.

This paper is most important, as containing a practical summary of the working of decimalization in countries where it has been attempted. The result seems to be that people refuse to adopt it for common mental work, and that the effect has been for such purposes to add to the former amount of labour the trouble of converting results from the old-fashioned coins in which they are worked out, to the decimal notation enforced by law.

Dr. Gray confirms Mr. Goddard's statement as to the persistence of Americans in using shillings for their ordinary retail calculations, in preference to dollars and cents. The whole paper is full of practical information.

G. W. HEMMING. G. W. Hemming.

With respect to my own paper, I have a few explanations to make. In the first place, I wish to express my regret that my opinion in favour of the present coinage, for the purpose of mental computation, was stated in such moderate terms. If I were writing my answers now, after examining all the illustrations adduced by decimalists in favour of their system, I should not content myself with saying that the proposed change would "increase rather than diminish" the difficulties of ordinary mental calculations. I am satisfied that it would enormously increase them, for this seems to me to be the case, even in the instances selected by the staunchest supporters of decimalization.

As my meaning has been misunderstood on another point, I take this occasion to explain that I have not absolutely advocated the complete duodecimalization of our metrical system, and that I have fully admitted that the idea of compelling the use of duodecimal arithmetic is quite visionary. The only points on which I have insisted are:—1st. That to duodecimalize all coins, measures, &c., would be easier and better than to introduce the pound and mil coinage. 2nd. That the present system is preferable to any decimal notation, mainly on the ground of its suitableness for mental work. I have given no opinion as to the advisability of making a change in the direction of duodecimals. Only if the desirability of making any change is to be further inquired into, I submit that an innovation in that direction is at least as deserving of consideration as the pound and mil scheme.

PROFESSOR KELLAND. Professor Kelland.

This paper contains a very interesting examination of the extent to which the old coinage still survives as an instrument of calculation in the United States; and the superiority of £ *s. d.* for mental work is insisted on throughout. It is a paper that does not admit of condensation, and must be read *in extenso*.

J. R. M'Culloch.

J. R. M'CULLOCH.

Mr. M'Culloch is decidedly opposed to any change in the coinage. He, like others, dwells especially on the fact that, by a very ready process, all the expected advantages might be secured by merchants without any legislative interference.

R. Slater.

R. SLATER.

Mr. Slater's replies are conclusions from practical experience of business; and he points out in various instances the inconvenience which a decimal coinage would introduce into mental reckoning. The paper is too full of details to be easily condensed; but see especially Answers 15—23, 22—25, 36, 38, 54—58, 60, 61, and 64.

R. Slater, Jun.

R. SLATER, JUN.

The evidence of this gentleman confirms the same views. See Answers 3, 9—12, 13, 23—25, 60, 61, 64, and 65.

J. Page.

J. PAGE.

This paper relates chiefly to what may be called transitional inconveniences of a change to a decimal notation; but it puts in a strong light the durable character of the mischief occasioned by a rude interference with established habits of calculation. Mr. Page has confined his attention for the most part to the operations relative to foreign exchange, on which he can speak with the authority of long experience; but it is probable that in all branches of commerce those most familiar with each would discover as many special inconveniences threatened by the projected decimal scheme, as Mr. Page has done in his own peculiar department.

Concluding Observations.

CONCLUDING OBSERVATIONS.

I have now extracted and referred to all the answers which have any material bearing on mental arithmetic. I will only add a few observations on one or two aspects of the question which have not been noticed in any of these papers.

There have been abundant complaints, on the part of the Decimalists, that Lord Overstone's questions propose a great many examples founded on assumed prices, particularly easy to deal with in our present coinage, and especially on even prices, such as a shilling a pound. To balance these illustrations, the advocates of a decimal coinage have pitted against them the cases easiest for decimals, and most inconvenient for £ *s. d.* But it is, after all, not very profitable to compare the degree of facility afforded by the cases selected as easy ones on either side. The easiest are so easy on both systems that it is not worth while to dwell on any superior convenience of £ *s. d.* in a comparison of these picked cases. Neither would it be fair to the present coinage to try the two systems by the crabbed examples expressly chosen for their inconvenience, when handled on the £ *s. d.* notation. Even when tested by these hostile cases, of which so many have already been noticed, I think most persons will agree that, for mental work, the existing coinage shows more favourably than decimals. But, whatever judgment may be formed on this point, there is another question of very great importance, which has been almost entirely neglected. It is this. In which system do the easy cases occur most frequently? Let us examine this point, putting aside for the moment the controversy that has arisen out of it as to the tendency of prices to accommodate themselves to the coinage, and only assume that a price is not less likely to occur because it is an easy one for calculation.

Now, first compare the frequency of those very easy cases which arise out of even prices, less than £1.

Since a florin is twice as large as a shilling, two even prices occur in our reckoning for every one in the pound and mil notation.

But this is only a small part of the advantage, for each even price in shillings leads to many more easy reckonings than each even price in florins does.

So far as multiplication alone is concerned, 1*fl.* is as easy a price as 1*s.*, and therefore, to estimate their comparative merits, we have only to ascertain the number of easily obtained fractions afforded by the two notations.

The following table is, I think, fair (including all divisors up to 16):—

	Present system, at the price of one shilling a pound, yard, &c.	Decimal system, at the price of one florin a pound, yard, &c.
1. Fractions which may be valued with no effort	$\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{12}$	$\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{10}$.
2. Fractions which may be valued with scarcely appreciable effort	$\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, and any multiples of $\frac{1}{12}$.	$\frac{4}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, and any multiples of $\frac{1}{10}$.
3. Cases a little less easy	$\frac{1}{8}$, and its multiples.	$\frac{1}{4}$, and $\frac{3}{4}$.
4. Moderately easy cases	$\frac{1}{16}$, and its multiples.	$\frac{1}{8}$, and its multiples.
5. Difficult cases	$\frac{1}{5}$, $\frac{1}{7}$, $\frac{1}{9}$, $\frac{1}{10}$, $\frac{1}{11}$, $\frac{1}{13}$, $\frac{1}{14}$, $\frac{1}{15}$, and their multiples.	$\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{9}$, $\frac{1}{11}$, $\frac{1}{12}$, $\frac{1}{13}$, $\frac{1}{14}$, $\frac{1}{15}$, $\frac{1}{16}$, and their multiples.

In the above comparison it is essential to observe, that not only is the number of easy cases greater with the present coinage, but that they occur with reference to the most important divisors. Thus the valuable fractions, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, and their multiples, are all a step higher in the table with the present coins than with a decimal notation. This is a necessary consequence of 12 being divisible by 4, while 10 is only divisible by 2.

Concluding Observations.

The fair conclusion, therefore, seems to be, that whenever an even price, such as a shilling a pound, occurs, it produces a much larger crop of easy calculations in the market than a corresponding even price in the decimal system would do; and as the even prices are also twice as numerous, it follows that the number of easy reckonings which spring from even prices in £ *s. d.* is much more than double what it would be with the pound and mil system.

However, even prices form but a small proportion of all that occur, and it is of great importance to compare the number of broken prices leading to tolerably easy computations which are presented by the two methods.

For this purpose we may take a range of prices from one to two shillings, as affording probably as fair a test as any.

With the present system, the list of prices very easy to deal with (besides the two even prices of 1*s.* and 2*s.*), are, first, the sums of 1*s.* 4*d.*, 1*s.* 6*d.* and 1*s.* 8*d.* On the other side, we have, within the same limits, viz., 5 cents to 1 florin (besides the even price of 1 florin), none which can be considered as equally easy prices, except perhaps 6 cents and 8 cents.

If we suppose the prices to descend as low as farthings on the one hand, and mils on the other, the greater number of very easy cases still occurs in the common system.

In fact, from the convenience of reckoning with halves and quarters of a penny (especially in the head, where simple fractions with low binary denominators are so much easier to manage than the corresponding decimals), it results that any price which differs only by farthings from an easy price cannot be excessively difficult to deal with. Thus 1*s.* 11¾*d.* is a remarkably easy price to start from, whether for division or multiplication, because it can be treated as 2*s.* less ¼*d.* And, generally, it may be said that no prices can present any real complexity for such computations as are required to be worked without paper, unless they differ from an easy price by a penny or more. Taking, therefore, 1*s.* 4*d.*, 1*s.* 6*d.*, 1*s.* 8*d.* as easy prices, no really difficult ones can occur between 1*s.* 3*d.* and 1*s.* 9*d.*

This removes from the most difficult class all prices within the limits we have selected, viz., 1*s.* and 2*s.*, except those between 1*s.* 1*d.* and 1*s.* 3*d.*, and between 1*s.* 9*d.* and 1*s.* 11*d.*; many even of these present scarcely any difficulty, for 1*s.* 3*d.* is itself only one degree less easy to deal with than 1*s.* 4*d.* or 1*s.* 8*d.*, being, in fact, better for multiplication, though not quite so readily divided by the binary divisors which most commonly occur. 1*s.* 9*d.* is also tolerably manageable; and taking a range up to one penny from these as only a little more troublesome, the most difficult cases are reduced to those from 1*s.* 1*d.* to 1*s.* 2*d.*, and from 1*s.* 10*d.* to 1*s.* 11d.—*i.e. to one-sixth of the whole number.* Now, to try the degree of difficulty in these, which are the worst cases of all, suppose prices of 1*s.* 1¾*d.* and 1*s.* 10½*d.*, and test them both by division and multiplication. Choosing the common divisors, 2, 3, 4, and 8, we get very readily—

½ (1*s.* 1¾*d.*) = {½ 1*s.* 2*d.*, or 7*d.*} — = 7*d.* +
⅔ (1*s.* 1¾*d.*) = {⅔ 1*s.*, or 8*d.*} + {⅔ 1½*d.*, or 1*d.*} + = 9*d.* +
¼ (1*s.* 1¾*d.*) = {¼ 1*s.*, or 3*d.*} + {¼ 2*d.*, or ½*d.*} — = 3½*d.* —
⅛ (1*s.* 1¾*d.*) = {⅛ 1*s.*, or 1½*d.*} + {⅛ 2*d.*, or ¼*d.*} — = 1¼*d.* —

Again, in multiplying 1*s.* 10½*d.*, try first a convenient number, as 4. We should say—

4 (1*s.* 10½*d.*) = {4 × 2*s.*, or 8*s.*} — {4 × 1½*d.*, or 6*d.*} = 7*s.* 6*d.*

If we choose as inconvenient a multiplier as possible without making it excessively large, as for example 13, we have—

13 (1*s.* 10½*d.*) = 26*s.* + {12 × 1½*d.*, or 1*s.* 6*d.* + 1½*d.*} = 1*l.* 4*s.* 4½*d.*

Even these, the difficult minority of common operations, might be worked off-hand with moderate effort by many illiterate persons, while the great majority of cases (at least five-sixths of all the calculations that could possibly occur) would be comparatively free from difficulty.

Now, if we try the corresponding decimal prices in the same way, the result does not appear equally favourable. It would be very difficult indeed to pick out five-sixths of the prices between 50*m.* and 1*fl.* which could be called even tolerably easy for both division and multiplication. 60*m.* and 80*m.* are very easy; 50*m.*, 70*m.*, and 90*m.* not very difficult. 64, 72, 84, 96 are also easy for division, but clumsy for multiplication. In fact, directly you introduce odd mils at all, the simplest multiplication becomes more or less troublesome. 72*m.* is divisible enough, but it would be a troublesome process for a half-educated man to multiply it in his head by 13. But to take an average decimal case to set against one of the prices which we have chosen as the most difficult for the present coinage (1*s.* 10½*d.*), we will try the exact equivalent of that sum, viz., 94 mils (not by any means the worst case that could be taken), and multiply by 4 and 13 as before. We have—

4 × (94) = 4 × 4, or 16, + 4 × 90 = 360 make 376.
13 × (94) = {13 × 4 = 3 × 4, or 12, + 10 × 4, or 40, = 52} +
{13 × 90, = 3 × 90, or 270, + 10 × 90, or 900, = 1170} make 1222.

These results would certainly be much more difficult to obtain without the aid of paper than those which we have before worked out.

Try again 57*m.*, the equivalent in value of 1*s.* 1¾*d.*, and work out the same fractions which we found before.

½ (57) = 2 + {½ 17, or 8 + } = 28 +
⅔ (57) = ⅓ (114) = 3 + (⅓ 24 or 8) = 38.
¼ (57) = 1 + {¼ (17) or 4 + } = 14 +
⅛ (57) = 7 +

These are assuredly not easier operations in the head than the former ones, and they are the results of comparing the most difficult prices in the common system with the amounts into which they translate in decimals; a comparison which would be most unfair to £ *s. d.* if I were not seeking to test the common notation by the severest trials.

If, instead of taking our examples from the minority of difficult prices, we had made any impartial selections from the large majority (five-sixths, as we have seen) of easy and moderately easy cases, there would have been a very plain advantage in favour of the present coinage. Thus 1*s.* 7*d.* and 1*s.* 4½*d.* are more readily multiplied and divided than 79*m.* and 69*m.* by almost any number that could be chosen, and there is no sort of comparison between 1*s.* 8*d.* or 1*s.* 6*d.*, and 83 or 75. And if higher prices are tried, the contrast is still more striking, as any one may satisfy himself by performing the same operations on such sums as 3*l.* 12*s.* 8*d.*, and 3633*m.*

CONCLUDING OBSERVATIONS.

But I have dwelt sufficiently on particular examples, and will conclude by summing up the results, which I conceive to be these :—

1st. That very easy cases in small reckonings must occur much oftener with £ *s.* *d.* than with pounds and mils.

2nd. That about five-sixths of all possible cases in £ *s.* *d.* are tolerably easy, while the proportion of tolerably easy cases in decimals, is very much less.

3rd. That the most difficult cases for £ *s.* *d.* are easier than average cases in decimals. This is established by the fact, that these difficult cases, as selected by opponents, have almost invariably proved to be easier than those into which they translate in the decimal notation. See the examples worked throughout this paper.

4th. That in cases from real life, chosen by decimalists, as fair average ones, £ *s.* *d.* have appeared clearly superior to decimals. See Mr. Miller's examples.

5th. That the only class of cases where decimals have any advantage is that which relates to per-centages, interest, and the like; a very small proportion of the whole.

6th. That almost invariably the strain upon the memory in working with £ *s.* *d.* is much less than it would be with decimals.

I am confident that no one will dispute these positions after going through the examples which have been discussed above, *and acutally working out each one for himself in both notations without any assistance whatever from paper.* Merely to look at the operations as I have set them down, without taking the trouble to work them out, will convey some, but only a very inadequate, idea of the superiority of our present coinage over any decimal system for the purpose of the mental arithmetic which is used by all classes every day of their lives.

Finally, I will observe that, in giving the mental work with £ *s.* *d.*, I have carefully abstained from availing myself of any of the special methods applicable to particular cases which are of very common occurrence. Many of these exceptional short-cuts will be found enumerated in the evidence of Dr. Gray (App. I., Ans. 456, p. 65), and another class of such devices is alluded to by Prof. De Morgan in his answer to Question 13. But it may be urged with some plausibility, though not with perfect correctness, that corresponding artifices will be available in decimal work; and I have therefore preferred to confine myself to a general method of mental work, always applicable, and always, or almost always, superior to the ordinary reckoning with a decimal notation.

MEMORANDUM

BY J. G. HUBBARD, ESQ., EMBODYING OBSERVATIONS TO ACCOMPANY HIS SIGNATURE OF THE REPORT.

The Draft Report proposed by Lord Overstone, which will be laid before Her Majesty, with the final Report of the Decimal Coinage Commissioners, discusses so fully and sums up so clearly the evidence and arguments which have been advanced on both sides of the question, that although I am unable to adopt every portion of that very comprehensive document, I need do little more than briefly state the considerations which have separately led me to the conclusions which constitute our joint and final Report.

In the Appendix to their Preliminary Report, the Commissioners included the "Answers received from Foreign Countries where a Decimal system has been adopted," and it seemed desirable, as a first step, to ascertain how far the circumstances and proceedings of any of those countries constituted a parallel which might make their action an example to ourselves, in the substitution of a Decimal for a Non-Decimal system of Coinage.

Of the countries from which answers have been received, the following are those which have substituted a Decimal for a Non-Decimal system:–

Lombardy,
Sardinia,
Belgium,
France,
Switzerland,
Netherlands,
United States of America.

In *Lombardy*, *Sardinia*, and *Belgium* the introduction of the franc and centime was the direct consequence of the French occupation under the Republican Government.

Switzerland, until 1850, was subject to the extreme inconvenience of having an independent right of coinage in each of its 22 cantons, and the Confederation, when it resolved to terminate the confusion which arose from the currency not only of the issues of several Swiss mints, but from that of French and German coins at arbitrary rates, naturally adopted the system which prevailed in France, their close neighbour on the west, and which had been accepted by the Sardinians on their southern boundary.

The *Netherlands*, up to so late a period as 1845 suffered the circulation of coins issuing from the private mints of towns, as well as from the provincial mints founded during the time of the Republic. The inconvenience arising from the variety of these coins, and from the differences in their intrinsic worth, and in the rates at which different provinces appreciated those of nominally the same value, required a remedy, and in framing a system for a new coinage, "the Decimal division was naturally adopted—not, "however, upon abstract preference, but because the same principle had been long "before adopted for weights and measures." Government of the Netherlands, II., p. 126.

The weight, then, of European evidence centres in that which is furnished by *France*. The answers received from that country contain all the arguments in favour of the monetary system which she adopted herself, and then imposed upon the countries which fell under her dominion. The several communications differ in the degree of popularity, which they ascribe to the reception of the Decimal system in that country, but, excepting one allusion to the irregularity of provincial valuations, they concur in denying that any special inconvenience attended the use of the ancient coinage. Neither do they affirm that the Decimal system for the regulation of the coinage was deliberately preferred to the non-decimal—but they imply that coins, as well as weights and measures, were subjected to the metrical standard, and graduated by a Decimal progression, in compliance with what one witness describes as "une passion violente and abstraite pour "l'unité en toutes choses," and another as "une intuition d'opposition ou de haine contre St. Hilaire, I. p. 223. St. Hilaire, I. p. 224.

Delessert, I. p. 216.

"l'ordre de choses qu'on venait de renverser." Undoubtedly the extravagance to which the hatred of existing institutions and the rage for decimalizing were carried, considerably impairs the force of the example France has set. The futile attempts to decimalize time, in violation of the laws of nature, and to erect the advent of the Republic, instead of the advent of the Redeemer, as the future landmark of history, effectually disproved the universal applicability of the Decimal theory, while they vividly illustrated the presumption and reckless zeal of its partizans.

It may be gathered from the French answers, that the decimalization of coins was adopted as part of a great system, which was to comprehend all mensuration,—that it is now (in combination with the decimalization of weights and measures) deemed more convenient than the former system—that 30 years from its introduction did not suffice to wear out its unpopularity—that after a lapse of 50 years it became necessary to enforce its use by penal laws, and that in spite even of these, mention is still occasionally made of the old denominations in money, and more frequently of the ancient weights and measures. The example of France will be persuasive only in so far as there may exist a similarity of motive and of antecedent circumstance, and a similar power of compulsion.

The provinces which now constitute the *United States of America*, previous to the War of Independence, recognized the £ as their unit of value and money of account, but owing to their unequal estimation of the £, different provinces had different pounds currency. These currencies were represented by no coinage of their own, but they permitted the circulation of coins current not only in England, but in France, Portugal, Spain, and Spanish America. In 1785, a coin nearly approaching to the Spanish American dollar decimally divided, was constituted the money of account, and in 1795 the United States Mint first issued the dollar, and its subdivisions of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{10}$, and $\frac{1}{20}$ in silver, the cent and $\frac{1}{2}$-cent in copper, and 10, 5, and $2\frac{1}{2}$-dollar pieces in gold.

The motives for the change existed in the complexity of the currencies anterior to the change, and the inconvenient differences in the value of the £ in the different States. Familiarity with the dollar, which had in fact been the common-measure of the several provincial currencies, decided its selection, while its Decimal divisibility was determined upon an abstract preference. The adoption of the altered system was made compulsory on public officers, but was left optional on all others. Although the non-decimal weights and measures have been retained, the dollar and its Decimal divisions are now in general use for accounts, but the old denominations of coins are still referred to by shopkeepers and their customers, and quoted in price currents.

Kelland, II. p. 170

The recent creation, and the comparatively small value of property of which the record was to be altered, were favourable to the change: and the subsequent rapid increase of population, of wealth, and of commercial transactions, which followed the simultaneous establishment of the independence of the United States, and of their adoption of the decimalized dollar as their monetary unit, powerfully assisted its reception; but these circumstances, peculiar to the United States, preclude the course which they pursued from forming a precedent for this country.

Canada has recently adopted the dollar and cent of the United States very much upon the same ground that Switzerland accepted the franc and centime of France, viz., the unsatisfactory condition of its previous currency, and the inducement of having a system of accounts identical with that of the country which was at once its nearest neighbour, and most closely united with it in commercial relations. Both Canada and the United States retain a non-decimal system of weights and measures, and, so far as evidence on that point has been given, it does not seem that any inconvenience or loss arises from the diversity of progression.

It would appear from this review that no precedent for us is to be found in the conditions which induced a change, or in the motives which more directly determined the adoption of a Decimal coinage in any of the countries which have been brought under our notice. It remains to investigate the evidence and abstract argument which would recommend the Decimal system upon its intrinsic and independent merits.

And here I may properly notice the great advantages which the Commission have derived from the answers to Lord Overstone's Paper of Questions. This paper gave to the advocates of the several Decimal Coinages which had been proposed an opportunity of removing the difficulties which, notwithstanding the ability with which their causes had been supported before the Committee of the House of Commons, and in various publications, were still felt by the Commission. To two of these, Professor De Morgan and Sir John Herschel, the Commission are indebted for elaborate and very able arguments in favour of the Pound and mil scheme, while to Mr. Hemming and Professor Kelland the

Commissioners are under deep obligation for the manner in which they brought high mathematical attainments to bear on the theoretical examination of the advantages of the present system, and on the disadvantages of the Decimal system of coinage. Professor Kelland was also enabled to illustrate the difficulties of a change from the experience he had acquired in the United States of America and in Canada.

As it was impracticable to test the principle of Decimals, except by taking some definite scheme and contrasting it with the existing system, it became necessary to consider the various plans described in the printed evidence laid before the Commissioners, and of these the Pound and mil scheme was selected as the best, because every other scheme would either—

1. Subvert the existing standard of value;
2. Displace to a serious extent the gold and silver coins now current;
3. Introduce a discrepancy between moneys of account and moneys of exchange; or,
4. Substitute for the pound sterling some other value as the highest unit.

On the other hand, the Pound and mil scheme is distinguished from the rival propositions not only by the approval of a Parliamentary Committee, and by a large array of scientific and influential supporters, but by its retaining the Pound, which must be admitted to be a matter of vast importance. The high unit upon which the monetary system of this country is based has peculiar advantages in the brevity and consequent accuracy with which large sums are expressed and made the subject of contract. The £ or sovereign is not only the expression of value, but it is also the *intrinsic value* which it represents; all contracts, public and private, all settlements of property, all financial engagements between this and other countries, are dependent upon the maintenance of this unit, so that its displacement would be an evil of most serious magnitude, such as would outweigh any advantages that could reasonably be expected from the change.

Divested of all needless complexities, the Pound and mil scheme may be in the simplest way described as substituting for the present denominations of shillings, pence, and farthings, resulting from the reduction of the pound by the divisors 20, 12, and 4, the new denominations of florins, cents, and mils, resulting from the reduction of the pound (the common basis of both systems) by the divisor 10. The coins which would circulate in harmony with this scheme would be—

			Mils.
Gold,	the Sovereign	equal to	1,000
	Half-sovereign	...	500
Silver,	Crown	...	250
	Half-crown	...	125
	Florin	...	100
	Shilling	...	50
	Half-shilling (perhaps) ...	...	25
	And a new piece of 1 cent, or (to replace the 4*d.* and 3*d.* pieces).		10
Copper,	New coins of ...	5 or	4
			2
			1

The only change required in the present silver coinage would be the substitution of a new piece of ten mils, or one cent, for the existing groats and threepenny pieces, and possibly of a twenty-mil piece for half-shillings. The copper money would require an entire re-coinage, and the Government might, upon proclamation, receive pence, halfpence, and farthings, in exchange for pieces of five or four mils, two mils, and one mil, at the rate of twenty-four farthings for twenty-five mils. No loss could thus accrue to the holders of copper money, nor would any loss be experienced by the Mint, as the new coins (being mere tokens) might be made considerably lighter in proportion than the old.

The French bronze-piece of ten centimes, which is equivalent in value to our penny, is in weight only equal to our halfpenny; but without diminishing the weight of our copper money to the extent of one half it might still be so far lightened as to afford a gain to the Government on the re-coinage, while it became more convenient for the use of the public.

Indeed the substitution of bronze for our ponderous copper money ought to take place, whether the coinage be decimalized or not.

Upon the expiration of the period fixed for the exchange of the copper coin, it might be ordered by royal proclamation that thenceforth the copper should be exchangeable

for silver coin at the rate of 100 mils for the florin or double shilling, and that accounts should be legally stated only in £, fl. cents, and mils.

In contrasting the Pound and mil scheme with our present system, the subject divides into two parts, viz., "moneys of account" and "moneys of exchange."

In a perfect system, the "moneys of account" would be identical with certain "moneys of exchange;" and the existing harmony between them in this country is an advantage, the loss of which would hardly be compensated by the introduction of the Decimal principle into "account-keeping" only. Transactions of the smallest scale are, in most instances, not recorded at all—some retail transactions are recorded on one side only, and in the aggregate; others again give rise to accounts in which they are recorded by both buyer and seller, while the more important wholesale transactions occasion extensive calculations and entries of "account-keeping," and are settled through the medium of banking expedients without the intervention of "moneys of exchange." The "coinage," therefore, the use of which this Commission has been appointed to consider, is chiefly concerned in the process of buying and selling by retail, and by its fitness or unfitness for those purposes will be mainly decided the question of public convenience, as involved in the multiplicity of small payments.

As affecting "moneys of account," it is asserted in favour of the Decimal system (by which term I always now mean the £ and m. scheme)—

Parliamentary Report.
That it would simplify accounts, and lead to greater accuracy;
That it would diminish the labour of calculations;
That it would tend to the convenience of those engaged in Exchange operations; and
That it would facilitate the education of the people.

On the other hand, the opponents of the Decimal £. and m. system affirm—

De Morgan, evidence, A. 709.
That it would require four columns instead of three;
Brown, Proceedings of Decimal Association, p. 17.
That it would require more figures to record the same facts;
Rationale, p. 29.
That it would require the use of higher figures;
Ibid.
That it would confuse and largely increase the labour of calculations and account-keeping;
Ibid.
That it would be inconvenient for the purposes of foreign exchange; and
That it would be utterly and altogether impracticable for the ordinary purposes of business.

Minasi, Statistical Journal, p. 249.
Both the assumptions in favour of the (Decimal) £ and mil scheme, and the objections urged against it appear, on examination, to have been greatly over stated.

J. Page, ans. p. 183.
On a comparison of the decimal £ and mil scheme with the present system, these features appear:—

Slater, pp. 52, 62.
In each system there are four denominations of money, but while in the present system the denomination of shillings and the denomination of pence both require a double column, the denominations of florins and cents require each but a single column. For the whole range of moneys the present system requires therefore *six* columns, the pound and mil system requires *four* columns. The statement of £ fl. c. m. requires fewer figures than a parallel statement of £ *s. d. f.*, but rather more figures than would be used if farthings were omitted.

Rationale, p. 39.
Slater, p. 57.
Laurie, xvii.
Slater, p. 50.
If on an average a statement of money in florins, cents, and mils require 100 figures—a similar statement in shillings, pence, and farthings may require 114 figures—or in shillings and pence (omitting farthings), 88 figures.

The addition and multiplication of £ fl. c. m. are effected by the simple operation of each of those rules, while the addition or multiplication of £ *s. d. f.* requires the exercise of division, and to multiply or divide sums comprising £ *s. d. f.* requires many more figures than would be needed for similar operations in decimals.

The occurrence of higher figures in the addition of mils and cents than in that of pence, arising from the pence immediately less than one shilling being 11 and 10, yields a very slight advantage in the addition of the first column of pence, and is more than counterbalanced by the existence of a second column.

Comparing statements of £ *s. d. f.* with statements of £ fl. c. m. the economy of figures is in favour of the £ and mil scheme, but as it is admitted that mils cannot be left out of that scheme owing to the high value ($2\frac{2}{5}d.$) of the cent, and that on the other hand in all larger accounts farthings are now neglected, the difference in number of figures is turned against the £ and mil scheme.

So far as the Decimal system simplifies calculation generally, so far, also, the computations of foreign exchanges would be facilitated by the adoption of that system; but there is no reason whatever to suppose that any other advantage or disadvantage could accrue to English merchants by the equivalent which they give being expressed decimally or non-decimally. The rate of exchange which this country gives or takes is regulated

with reference to the value of the pound sterling, and so long as the standard of value remains unaltered, a variation of the relative proportions of the subsidiary coins would be wholly immaterial.

The exchange between London and St. Petersburgh for instance, may be 38*d.* per silver ruble, but that statement means 38 times the 240th part of £1. If the penny were altered in its value, or were altogether suppressed, there would be no difficulty in providing other and equally accurate expressions of the sterling equivalent given by London for the silver ruble. If even the disuse of the present minor English coins were to lead to a reversal of the custom now partially prevailing, and if foreign countries were to give the variable for the invariable pound sterling, still no inconvenience could arise. I am satisfied that as regards the foreign exchanges, both the praise and censure levelled against decimals have been entirely misplaced.

An important economy of time in the work of instruction in arithmetic seems to have been inferred from the economy of time which the Decimal system would effect in the *practice* of arithmetic; but the gain is excessively overrated, for the objection to the present system is not that it requires any abstruse or difficult operations, but that it occasions a larger expenditure of labour, and needs several rules of arithmetic to effect compound addition or multiplication. Yet every possible calculation touching pounds, shillings, and pence, can be made by the aid of the four rules of arithmetic, and it can hardly be supposed that the most meagre arithmetical education could omit either addition, subtraction, multiplication, or division, so that the expected gain must arise, if at all, from stopping short of the more complete education in arithmetic rendered necessary by the complex computations which the present system requires.

Even for their primary and essential purposes, the payment of the wages of labour and the purchase of commodities in retail, the fitness of our existing coins is as confidently denied by one party as it is asserted by another. To determine the degree of estimation in which they are held is not so much, however, the object of this inquiry as to consider the alleged superiority of the coins which would supplant them under a Decimal system.

The opponents of the £ and mil scheme affirm that, to decimalize the coinage upon that system would entail these evils:—

1. That it would occasion an immediate loss of 4 per cent. to the holders of copper money.

2. That the cent and mil would not be interchangeable with the penny, halfpenny, and farthing.

3. That the cent and mil are ill fitted for mental conception and calculation.

4. That they would not harmonise with our present non-decimal system of weights and measures, and would permanently expose the people to loss in the purchase of commodities in small quantities arising from the constant occurrence, in the reduction of the price to decimal coins, of a fraction which would be charged against the purchaser.

1.—*A.* The first of these objections might be disposed of by the Government calling in and exchanging the existing copper coin at its present value.

2.—*A.* The non-interchangeability of the lower coins would create two difficulties requiring specific adjustment.

Debts contracted under the old system could not, in all instances, be exactly discharged in the new coinage, but the slight and unimportant difference would be settled in accordance with some legal provision.

Customs duties, taxes, stamps, wages, and tolls, whenever levied by the penny, would require revision, and in many cases alteration. The postage, receipt, cheque, and newspaper penny stamp would be the first and most important taxes requiring revision. Each of these might be kept closely to its present rate by being fixed at 4 mils, or it might be raised to 5. In the former case, the revenue would lose some 100,000*l.*; in the latter it would gain very largely. Whether the stamp be one of 4 mils or of 5 should determine the coinage of a 4 or 5 mil piece (for they should not coexist, as their similarity would lead to many mistakes), so that the stamp may be procured with a single coin. The 5 mil piece would have the advantage of being half a cent. The 4 mil piece, being the practical equivalent of the penny, would go far towards reconciling the people to the new system.

The customs and excise duties would require adjustment; but there would be no cause of regret for this necessity. Both schedules require simplification, being still embarrassed with the additional 5 per cent. imposed in 1840. In the re-adjustment of these and of the stamp duties it would be quite unnecessary to aim at an equivalence of charge for each item; and it is raising gratuitous difficulties to allege, that in such and such a case the Government would lose so many thousands, and that in such

another the people would be so much more heavily taxed. There is no separate or conflicting interest between the Government and the people. The Government are the stewards of the people. That they should wisely raise and economically expend the national revenue is important; but whether a few hundred thousands are levied more in stamps and less in customs, or vice versâ, is quite immaterial.

The pay of the army and navy would present no serious difficulty. All existing engagements would have to be worked out and be settled at the present rates, while future engagements would be made in the new currency.

Generally, it may be affirmed that no insuperable difficulty would occur in the re-adjustment of any public charge, claim, or debt.

Private tolls and dues would require a most careful and considerate treatment; and there can be no doubt that to re-adjust them upon equitable terms would be one of the chief difficulties of the change.

3.—*A.* There are some questions of which no amount of discussion can ensure the solution. The comparative adaptability of a Decimal coinage for mental conception and calculation is one of these. Few persons are qualified to speak with equal experience of both systems, and it is *habit* which will generally determine the verdict. A Parisian would naturally decide in favour of a decimal, and a Londoner of a duodecimal system as simple, convenient, and well suited for mental conception and calculation. Thus much, however, may be affirmed, that there is an entire absence of any discontent with the shilling and the penny amongst the numerous class whose daily calculations and mental conceptions are affected by them; and that no proof that their calculations would be facilitated by the change can be gathered from the evidence of the scientific advocates of Decimalization.

4.—*A.* Upon the fourth objection it may be observed, that a diversity of progression between coins and weights and measures may present an apparent want of harmony, without producing any practical inconvenience. The capacity for continuous binary subdivision required in weights and measures which define quantity in commodities, is not alike needful in coins. Coins are not generally themselves the object of division, their chief use being to exchange for commodities, and their chief requisite the quality of being easily combined into any desired amount.

Prices are variable, and when determined by the ordinary considerations of cost, supply, and demand, they fix themselves in the *wholesale* market irrespectively of coins, with which they have no tendency to harmonise. In the retail market commodities are more frequently offered at prices which one, two, or more (but still a *few*) coins can represent; but these prices are so fixed, not as a result of the wholesale value increased by the costs and profits of the retailer, but as a contrivance to meet the convenience of the purchaser; and so far is this convenience of the buyer studied, that in fixing by the lb. the prices of those articles which are habitually purchased by the half-lb., quarter-lb. or ounce, the shopkeeper selects the prices which are divisible without a remainder by 2, 4, or 16. Thus the leading prices for sugar, coffee, and tea are respectively 4*d.*, 1*s.* 4*d.*, and 4*s.* per lb. Upon the same principle the variations in the price of tea, for instance, are found in retail shops to be not less than 4*d.* per lb., although tea sells wholesale at prices differing by gradations of only one farthing. The interpretation of this apparent discrepancy is, that "the articles are rather accommodated to the price than the price to the articles." The motive which has hitherto determined (within certain limits) the retail price of commodities would still operate under a Decimal system, and the shopkeeper who had fixed his goods at rates which would divide without fractions of a farthing into the smallest quantities sold, would in the same way contrive that their prices in florins, cents, and mils, should divide without a remainder by 2, 4, 8, or 16. To accomplish this, however, he must sacrifice in many instances a simple expression of the price of the larger quantity, *e.g.*, he can now mark tea 4*s.* per lb., or 3*d.* per oz.; he may hereafter fix upon come article a price per lb. which will divide into a price of 3 cents per oz., but the price per lb. must be marked 4 florins 8 cents. The want of harmony of progression entails this result, that less frequently than at present, the price of the lb., and the price of the subdivision of the lb. can both be represented concisely in figures and in coins.

Strugnell, I. p. 166. Kirkham, I. p. 165.

The only article which is excepted from these remarks as to price is gold; gold being itself in this country the measure of value, is in price invariable, and the rate at which the Bank sells gold, and at which the gold coin passes as legal tender, viz., 3*l.* 17*s.* 10½*d.*, cannot be varied without disturbing every existing engagement; and the oz. of gold under the £ and m. scheme would, of necessity, be reckoned at the exact equivalent of 3*l.* 17*s.* 10½*d.*, viz., 3*l.* 8fl. 9c. 3·75m. or 3*l.* 8fl. 9c. 3¾m.

As a plea in favour of a Decimal system, it has been urged, "that a perfect system of coinage should be constructed on a decimal progression upwards and downwards,

in harmony with arithmetical numeration. But those who urge this argument seem to forget that all computations are not effected by multiplication; that in a large number of cases the purchases of the labouring classes are fractions of what is to them the unit of quantity, and that for a reduction from the unit the Decimal system offers no facility.

The true theory appears to me to be that the multiplication of the unit should proceed decimally, but that division should be effected binarily; the unit being fixed with reference to the value of commodities and the magnitude of the transactions in which it appears. Practically, however, a single unit does not answer all purposes, and units of different magnitudes are required, owing to the wide variations in the value of commodities, and in the scale of transactions affecting them. The oz. and the lb. become the practical units of retail transactions, or of transactions in commodities of high value, while the cwt. and the ton are the units in wholesale transactions, or in transactions in goods of low value. Sugar is sold retail by the oz. in the New Cut, Lambeth, but wholesale by the cwt. in Mincing Lane. The ton is the unit of dealers in hemp and flax; the lb. is the unit of dealers in silk.

And similarly with reference to the coinage. The £, the shilling, and the penny are severally the units of the several classes of the community. Of the convenience of a high unit, such as the £, to a wealthy country like ours there can be no doubt in the mind of any one who considers the many instances in which Pounds alone require mention, and in which therefore the expression of the same sums in florins would be a grave, and in cents an intolerable inconvenience. But to the labouring classes, the shilling and the penny are the exponents of value and the medium of exchange, while to the £ they are practically strangers.

These considerations lead to the conclusion that, the different gradations in weights and measures should be distinct in their expression, and that the weight or measure specially connected with the dealings of the largest, *i.e.* the labouring class, should be one of which the subdivisions are binary. The pound avoirdupois holds this position. Nearly all the articles consumed by the labouring classes are purchased by the pound or by the ounce. An attempt to destroy the pound weight as the popular expression of quantity would be as injudicious as it would be fruitless. The experience of France is valuable on this point, the livre de poids was the fixed idea of weight which the introduction of the gramme and its multiples failed to eradicate, but the kilogramme being approximatively two livres, and the use of the old denominations being prohibited, and legally punishable, the popular necessity and the legal obligation were reconciled by giving to the old weights and measures their equivalent expression in the decimal nomenclature; and at the present time if a Parisian housekeeper asks at a magazin in the Rue St. Honoré, for "une livre de bougies à 33 sous," she receives a packet inscribed "485 grammes," for which her account is charged "1·65 centimes." Each higher gradation of the weight or measure may or may not be a binary multiple of the one below; but it is important that it hold a distinct individuality. In contrast with what I have here said of weights and measures, money (I will again remark, being rarely the object of division) should be represented by coins divisible into parts, of which a combination into a given sum may easily be accomplished, and this it is undeniable, can be as readily effected with a thousand parts of a £ called mils, as with the 960 parts of a £ called farthings. The apprehended inconvenience of a Decimal coinage acting concurrently with a binary system of weights and measures, is well founded so far only as there should prevail a series of even money prices, and as sales in binary fractions should be made of the commodities which have been so priced.

Upon the connexion between decimal coins and decimal weights and measures, most contradictory opinions have been given. Some affirm and some deny, that to decimalize money would be useless unless weights and measures were also decimalized. Some consider that the decimalization of weights and measures should precede that of coins, others reverse the order of precedence.

My own opinion is that the decimalization of weights and measures would necessarily entail the decimalization of coins, but that the decimalization of coins would not necessarily entail that of weights and measures, and that a decimal coinage would not only facilitate calculations in the abstract, but that when applied to the computation of quantities its advantages would not be wholly counteracted by the non-decimal construction of weights and measures.

While I have endeavoured impartially to describe the Pound and mil scheme in its simplest and therefore most acceptable character, and to dissipate some of the difficulties which are apprehended as inseparable from its introduction, I feel bound not to leave the subject without adverting to what has been so ably stated by Mr. Hemming, Professor Kelland, and others, as to the peculiar merits of our existing coinage.

Gold, silver, and copper, the three metals of currency, are represented in the three units of account—pounds, shillings, and pence; and they are so represented by coins of the most convenient size, each superior coin or unit rising above its inferior by being the multiple by 4 of the three prime numbers 1, 3, and 5. The relative value of silver and gold concurs with the operation of this principle to produce in the shilling and the sovereign coins at once the most convenient in size and identical with the units of account. No Decimal system of coinage could afford such a combination of advantages. That the sovereign is a very convenient size and value, for a gold coin, is obvious from the fact that other countries have deviated from their decimal results to obtain coins approximative to it in value. The United States of America coins habitually, not the eagle piece of 10 dollars, but the half-eagle of 5 dollars nearly equal to the sovereign. France coins habitually not the gold coin of 10 francs, but one of 20 francs. Russia coins habitually not an imperial of 10 rubles, but a half-imperial of 5 rubles 15 copecs, nearly equal to the napoleon.

I have earlier spoken of the Pound and mil scheme as substituting four denominations of coins for the four denominations comprised in the actual system; but it is undeniable that while, except in particular cases, farthings are excepted from our present accounts, mils cannot be excepted from an active part in either accounts or payments under a Decimal system; and this, if from no other cause, would necessarily result from realizing what is in fact the essence of the proposed change; the replacement, viz., of our present copper coinage by one of a value four per cent. less. I cannot believe that either the shilling or the penny can be taken out of the use of the labouring classes. A 4-mil piece might be substituted for the present penny, but it would be called a penny, and no great mischief would result from its being so used; but of this new penny $12\frac{1}{2}$ would make a shilling, $6\frac{1}{4}$ would make half a shilling. It is questionable whether this awkward valuation of the half shilling would not lead to its replacement by a 20 mil piece; but in any case the existence (indispensable as I believe it), of a 4-mil piece would determine the general retention of a mil column in accounts.

The consideration of an international coinage was one which did not fall within the terms of the inquiry assigned to the Commissioners, but as the expectation of such a scheme being adopted had evidently influenced the opinions of many witnesses in favour of a Decimal system, it may be well to remark that, to give reality to an international coinage, it would be requisite that the countries included in the international coinage league should have the same standard of value—that all their coins should be identical in form, weight, and fineness, and that each country in the league should have such faith in the honesty and accuracy of the mints of all the others as to warrant their coinage being recognized equally with its own as a legal tender. If this difficulty were surmounted the advantage of an international coinage would be limited to the facility it might afford to inexperienced travellers, by enabling them to pass in all countries alike a coin of which they already knew the value. But for the larger purposes of commerce the institution of an international coinage would yield no appreciable assistance. The comparatively small transmissions of the precious metals which are needed for the rectification of the exchanges are already made with an ease and accuracy that could not be exceeded. Frequently, even now, it is in its own coin that a country requiring payment receives the liquidation of its claim.

The readiness or reluctance with which a Decimal system would be accepted by the people, must form an important consideration before its legal adoption is determined. And on this point the experience of foreign countries is not encouraging. Half a century has not extirpated in France the attachment of the people to their former habits of counting and measuring—if our people are more intelligent they are certainly not less decided in their prejudices, and they would not tolerate the penal enactments which, in other countries, were passed to assist the revolutionary change.

I briefly sum up the results of this inquiry upon my own mind:—

1. That the advantage of decimalizing the coinage would be, as affecting it in its use, as "*Money of account*," a diminution in the amount of labour in account-keeping, and, consequent upon the greater simplicity of the required operations, a diminished liability to error.

2. That wherever in calculations or accounts, Decimal statements are supposed to diminish labour, they can be resorted to under the present system, as exemplified at the National Debt Office, and at the Equitable Assurance, without disturbing the coinage.

3. That as affecting the coinage in its use as "*Money of exchange*," it cannot be predicted that any advantage would result to the public at large, while the process of transition would entail inconveniences of greater or less duration upon the labouring classes.

4. That the change in the value of the copper money would require the re-adjustment of many taxes, dues, and tolls, easily effected when levied by the Government, but requiring much consideration and judicious treatment when private rights are involved in them, and opposing in the difficulty of reconciling conflicting interests one of the most formidable obstacles to the change.

5. That a recoinage of the existing copper money ought to be made under any circumstances, and that the additional labour of recoining the silver pieces of three, four, and possibly of sixpence, would be no substantial objection to the adoption of a Decimal coinage.

6. That deliberately weighing the presumed advantages of the proposed change against the wide-spread inconvenience of the transitional difficulties which must attend it even if successful, I do not feel justified in recommending the adoption of a Decimal division of the Coinage of the United Kingdom, and I entirely concur in the Resolutions which constitute the Final Report of the Commission.

J. G. H.

OBSERVATIONS

PREPARED AT THE REQUEST AND FOR THE USE OF THE DECIMAL COINAGE COMMISSIONERS BY A. SMITH, ESQ., SECRETARY.

In considering the arguments which have been adduced on the several sides of the question referred to the Commissioners, it will, I think, appear that the difficulty is not so much in deciding as to each particular property of the present or of any proposed decimal system, whether it is an advantage or a disadvantage, as in estimating the general balance of advantages and disadvantages between retaining the present and introducing any particular system of decimal coinage. The former frequently is or approaches to being a matter of demonstration; the latter from its nature cannot be so. It appears to me, therefore, that I can best assist the Commissioners in their inquiry by offering some detailed observations on the questions which come under the first head, referring more briefly to those which come under the second.

The examples of foreign countries do not appear to me to be encouraging.

If, on the one hand, they show that a decimal system when completely established is convenient and popular whatever be its units, and whether the division of weights and measures be or be not decimal, on the other hand they show certain difficulties and inconveniences at the lower end of the scale, where the binary and decimal progressions come in contact,—a point which will be more conveniently considered in the subsequent part of these observations.

But it is as to the difficulties of the transition that their example is least encouraging. In no country has a change been made or attempted in which a coinage so uniform and so convenient as our own was previously established, or in which the people were so entirely unused to any other system of coinage.

The United States of America is the country in which a decimal coinage was first introduced in modern times.

At the revolution the different provinces had different provincial currencies of £ *s.* *d.*, but without coins to represent them. The coins in actual currency were the dollar and its binary and decimal subdivisions, and these were the common-measures of the provincial currencies, the dollar being equal to 6*s.* in New England and Virginia, 8*s.* in New York and North Carolina, 7*s.* 6*d.* in the middle states, and 4*s.* 8*d.* in South Carolina and Georgia.

Snowden, App. I., p. 332.

The change was caused by "the necessity and constitutional duty imposed on congress of establishing "a uniform currency for the United States." It was effected by taking the familiar coin and common-measure of all the currencies—the dollar—as the unit and as the want of uniformity arose from the different division of the dollar in the different states, it was removed by introducing a new and uniform decimal division in which the dollar was divided into 100 cents. In this new currency the New York shilling was $12\frac{1}{2}$ cents, the New England shilling $16\frac{2}{3}$ cents, and two generations afterwards these inconvenient divisions still remained in the habits of the people and in the prices of articles.

The change was made in France under circumstances which happily form no precedent for us. It was introduced in the first fervour of revolutionary change, when a desire for change as well as a desire for uniformity was a passion. The change too was of a singularly simple nature. The livre being divided into 20 sous and the sou being the lowest coin in common use, by writing the sou as 5 centimes the coinage became decimal.

In the other countries of Europe in which a decimal system was adopted the antecedent system of coinage was generally complicated and inconsistent, the decimal coinage of France and other adjoining countries was familiar, and in some cases the change was adopted under the direct pressure of foreign domination.

In this country none of the circumstances exist which have induced or compelled a change in other countries. We possess a uniform and unmixed coinage in which no change has been made of any kind for more than 100 years, and which is closely intertwined with all the transactions of life; and we have reached a state of civilization, and a fixed and settled order of things, in which the very slightest change in any of our monetary units could not be made without most serious derangement. We have a coinage which we all find to be convenient, which I believe to be the most convenient of all possible non-decimal coinages, which has no defect except that it is non-decimal, which has some advantages which no decimal coinage can possess, and others, which the pound and mil coinage, its principal rival, does not possess.

In comparing our present coinage with a decimal coinage in the abstract, we can only take into account that property which every decimal coinage has, viz., the existence of the same relation between its units as exists between the units of common arithmetic. This property is of the greatest possible value. Its value consists in this, that any sum written down or conceived in the mind may, without alteration of figures, and without mental effort, be considered and treated as expressed in terms of any one or more of the units. The labour of reduction is thus in all cases saved and interest and other money tables are very greatly abridged.

In all multiplication of money, in division by a number greater than twelve, in the calculation of percentages, in the use of logarithms, and, generally, in all paper calculations, using this term to denote calculations which cannot easily or at all be made in the head, the saving of labour obtained by a decimal system is very great.

In division by numbers less than 12 there is less advantage. In division there is, as pointed out by Mr. Hemming in his answers to Lord Overstone's questions, an advantage in the divisor being a factor of the radix, and little advantage in the radix being that of common arithmetic. There is, therefore, an advantage in having a radix which has as many divisors as possible. For this reason the division of any number of shillings by 3, 4, or 6, may be often more easily performed in our present system than if the same sum were expressed in the florins and cents of the pound and mil system.

This divisibility of the units of our present system makes the mode of computation called "practice" one of great convenience, and in very many cases makes the computation of prices by the present system not less convenient than by a decimal system. The observation should, however, not be omitted, that a decimal coinage, even with non-decimal weights and measures, gives in "practice" this advantage,—that by taking the price for the multiplicand, the multiplicand may always be treated as a whole number.

In the addition of more than two lines of figures there is probably some, though a less, advantage on the side of a decimal system.

If weights and measures were decimalized as well as moneys, the balance in favour of a decimal system would still more preponderate.

In that case not only would the operations of the skilled computer be simplified, but the theory of the operations would be simplified. The calculation of prices would be effected by the processes of simple arithmetic, and much that is perplexing in the present system would be avoided; but this cannot be

the case unless weights and measures are decimalized. Unless that be done the principles of compound arithmetic must still be taught.

In mental calculation an advantage is obtained by a decimal scale in another way. The facility of expressing a sum in one or other of the units at pleasure gives in mental addition some of the facility which in paper addition is obtained by writing quantities of the same order under one another. To take a simple case: if we multiply mentally 23 by 7 we say $7\times20=140$, $7\times3=21$, $140+21=161$. It is easier to multiply 2^{cents} 3^{mils} by 7, giving 14 cents 21 mils = 14 cents + 2 cents + 1 mil = 16 cents 1 mil. Here the mental change of 21 mils into 2 cents 1 mil, which is made without effort, gives us 14 and 2 to add instead of 140 and 21.

But there is a large class of mental calculations into which different considerations enter, those, namely, in which the money scale, or rather the coincidence of the money scale with the arithmetical scale, is unimportant; and in such cases there are advantages in having a money scale abstractly more perfect than the scale of 10, as, for instance, the scale of 4, 12, or even, for some purposes, 20.

The advantages are in the following particulars. In mental calculation division by a number less than 12 is, in fact, easier than multiplication. This, I think, will hardly be disputed by those who make the trial. The reasons appear to be in part the following. Mental division is performed in the way to which we are accustomed in paper division. Mental multiplication, as has been shown by Mr. Hemming, is performed in a totally different way, and by beginning at what would be called in paper calculation the wrong end. In mental division a figure in the product once obtained is not afterwards altered; in mental multiplication a number of separate results are obtained, which are combined without the aid given in paper calculation by writing like quantities under one another. In division the number of figures with which we start is generally diminished; in multiplication it is increased. Lastly, the facility which arises from the divisor being a factor of the radix is experienced much more in mental than in paper calculation. The consequence of these peculiarities is, that in mental calculation of prices the mind, whenever it is possible, substitutes division for multiplication, and this substitution and the consequent division are both facilitated by the mutual ratios of the units being those numbers which have the largest number of factors, and especially of binary factors.

The consequence is that for a large number of mental calculations, as well as for questions worked on paper by "practice," there are compensating advantages in the present system; and when these are taken in combination with the advantages derived from the prevalence of binary division in our weights and measures, the preponderance of advantage, which at first sight appears to be so much on the side of a decimal coinage, is considerably diminished.

The advantages of a decimal coinage are most apparent when the question is considered in the abstract. The difficulties and disadvantages do not appear till we consider the several proposed schemes separately.

These difficulties are not merely felt by those who may be supposed to be prejudiced in favour of the existing state of things, but are so serious and so strongly felt even by those who desire the introduction of decimal coinage, that I believe I am correct in saying that, without exception, or with hardly an exception, the advocates of each of the eleven schemes which have been proposed, founded on the present coinage, and which will be found in the Appendix to the Preliminary Report of the Commissioners, would prefer a retention of the present system to the introduction of any of the other ten.

In considering then the difficulties and disadvantages of a decimal coinage, and comparing it with the present system, it is necessary to select some one system with which the comparison shall be made.

In doing this we can have no hesitation in selecting the £ and mil scheme as the only one requiring serious consideration, not so much from its intrinsic merits, as from the fact that it is the only one which has been advocated by any considerable or important body of supporters, and also for the reason which has procured it that support, viz., that it retains the pound as the principal unit, and the shilling as a leading coin, although not a unit.

I will, therefore, in the first instance, confine myself to the consideration of the relative merits of the £ and mil scheme and of the present system in those points which do not depend on the exact numerical relation of the units, referring to the other schemes only for illustration.

The points on which the comparison may be made are:—

1. The size and value of the upper units.
2. The value and subdivision of the lowest unit.
3. The number of units.
4. The mutual relation of the units, considered with regard to other purposes than calculation.
5. The convenience of the intermediate coins.
6. Convenience for account keeping (not involving calculation).

In all these points, except the last, we shall find that our present coinage has a decided superiority over the £ and mil, and in the last that it is little, if at all, inferior.

1. *The Size and Value of the Upper Units.*

In our coinage the gold and silver coins which have the greatest circulation are the sovereign and the shilling. This is due, not to their being units, but wholly or chiefly to their convenient size—a size which depends on a physical and absolute quality, viz., its relation to the size of the human fingers. The most convenient size for a coin in which considerable, but not very large, sums are to be paid, is the smallest size which can be conveniently taken up between the finger and thumb, and counted. The half-sovereign and sixpence would be too small for the principal coins of circulation. They are only useful in paying fractions of the larger coins. A coin much larger than the sovereign or shilling is not more easily counted or handled, is not more convenient in the purse, and we gain less in convenience by its increased size in the payment of large sums than we lose by it in the payment of small sums. Such coins are in fact only useful for special purposes, such as the following:—

In countries having a silver currency, as in France till lately, in which gold is not in general circulation, and in which large sums are paid in silver, a coin is required which may be taken up in the hand, not between the finger and thumb, and which is carried in a bag, not in a purse; in such cases such a coin as the 5-franc piece is convenient.

For other purposes too, as for gratuities where the amount of payment has no exact measure, it is convenient to have a coin which carries with it a reason for its selection. For this reason half-a-crown is no doubt much more frequently given as a gratuity than three shillings or two shillings. A coin larger than the shilling if, like the half-crown, it contains an odd number of sixpences, may sometimes be more convenient than shillings. A coin like the florin can rarely be more convenient than two shillings.

But with these exceptions coins not differing much in size from the shilling and sovereign are evidently the most convenient.

How far, if at all, these conveniences which have given so much popularity to the sovereign and shilling depend on *value* as distinguished from *size* is a more difficult question.

The convenience of a coin as regards value depends so much on habit that it is difficult to consider a coin with which we are familiar as inconvenient, or a coin as convenient which is unfamiliar, and of which, or of sums expressed in which, we form no distinct

mental conception till we translate them into a familiar coinage.

The advocates of the £ and mil scheme, as well as the advocates of the present system, frequently insist on the advantage of an upper unit of high value, in facilitating the conception and expression of large sums. I doubt whether this is not a matter of habit. In dealing with high numbers the mind, aided by language, inevitably forms for itself higher units from the aggregate of lower units. In speaking of the income of an individual we think and speak of his hundreds or thousands a year, making a hundred or a thousand the unit. In speaking of the national income or debt we make a million the unit. We have certainly as clear a conception of thirty-five millions as of three hundred and fifty thousand. So when the rupee is the unit, the lack, and the crore, when the rea is the unit, the conto, form higher units, which facilitate the conception of large sums. I do not therefore think that in this respect the present or the pound and mil scheme has any advantage over the halfpenny scheme with an upper unit of 4*s.* 2*d.*, or over the penny scheme with an upper unit of 8*s.* 4*d.*

That the greater convenience and larger circulation of the shilling and sovereign depend on their size, and not on their being units, appears further from the experience of other countries in which the silver and gold coins in most common circulation are not units, but are the coins nearest in size to the shilling and sovereign. Thus in France the principal gold coin is the napoleon, which approaches the sovereign in size, but is not a unit. In the United States the principal gold coin is the half-eagle or 5-dollar piece, and the principal silver coin the quarter-dollar or 25-cent piece, neither of which is a unit. In England alone both the gold and silver coins in greatest circulation are units. That this is an advantage cannot, I think, be questioned. It is an advantage which is inconsistent with a decimal coinage, because the relation in value between the most convenient gold and silver coins is about 20 : 1. Of the eleven decimal schemes founded on our present coinage given in the table to the Preliminary Report, three, viz., the "£ and mil," the "farthing," and the "guinea," have this convenient gold unit; two, the "twenty-penny" and the "half-crown" have a gold unit not differing very greatly from it; three, the "eight shilling," "penny," and "ten shilling," have, like the French coinage, a silver unit of this size; three, the "four shilling," "halfpenny," and "crown," have, like the United States coinage, neither a gold or silver unit of this size.

2. *Value and subdivision of the lowest unit.*

This appears to me a point of the very greatest importance. One of the points which appears to me most clear as regards any system of coinage, decimal or non-decimal, is this, *that the lowest unit ought to be, not the lowest coin in circulation, but the lowest coin usually entered in accounts, and that the subdivision of the lowest unit should consist of one or two binary steps.*

In a perfect coinage more than one minimum coin is required.

When the most convenient minimum for commercial and trading accounts, and for the usual dealings of all classes of society above the poorest, has been determined, a lower coin is required for the occasional dealings of the wealthier classes, and the usual dealings of the poorer classes,—a coin to be only occasionally and exceptionally written and included in accounts. This second minimum ought, for convenience of payment, to be an aliquot part of the first minimum, and at the same time to approach as near to it in value as possible, *i.e.*, the second minimum ought to be one half of the first minimum. If a still smaller coin be required as a third minimum for the occasional dealings of the poorest classes, the same considerations show that it ought to be one half of the second minimum, and one fourth of the first minimum.

Experience shows that in England the penny is a convenient minimum for ordinary written accounts, and for the dealings of a large class of society, and that the halfpenny is used by that class as an occasional coin, and is also convenient as the ordinary minimum of the poorer classes, and that the farthing is convenient as an occasional coin of the poorest classes.

There would be evidently great inconvenience in expressing in farthings all sums now expressed in pence, and the convenience arising from the conciseness of expression of all sums expressed in a whole number of pence much more than compensates for the inconvenience of the occasional use of a binary fraction.

Our present coinage therefore in the value and subdivision of its lowest unit fulfils those conditions which *à priori* considerations show to be most advantageous. The only doubt which rests on this part of the case appears to me to be as to whether the ultimate binary subdivision ought to have one or two steps. In other words, supposing the farthing to be the lowest *coin* required, whether the lowest *unit* should be a halfpenny divided once binarily, or a penny divided twice binarily. The one has the advantage, in writing, of fewer and simpler fractions; the other, when there are no fractions, of expressing sums in lower numbers. But there can be no doubt, I think, that the expressing all sums in so low a unit as the farthing or mil is a disadvantage.

It is to be observed that the binary division of the lower unit is not inconsistent with a decimal coinage, that in fact in some decimal coinages in which the lowest unit is too large to be the smallest coin, the smallest coin is treated as a fraction; that in other decimal coinages in which the lowest unit is smaller than is necessary as a coin of exchange, there is an approach to the same binary division in the use of a minimum coin of five times the value of the lowest unit.

Thus in the United States the cent, in Russia the copeck, in the Netherlands the cent, are divided into halves.

In Naples the grano is divided into halves and quarters. In France and in countries using the French coinage the lowest usual coin of exchange and of account is of the value of 5 centimes.

In Portugal, where the unit, the rea, is as low as $\frac{1}{20}$ of a penny, the most frequent of the lower coins is the vintem of 20 reas, divided into $\frac{1}{2}$ or 10 reas, and $\frac{1}{4}$ or 5 reas, and bearing a strong analogy to our penny, halfpenny, and farthing.

Notwithstanding these instances, and notwithstanding what appears to me to be the very manifest advantage arising from the double minimum which it implies and allows, there is a singular difference of opinion among the advocates of decimal coinage as to the introduction of such a binary division of the lowest unit of a decimal coinage. The 47th of Lord Overstone's questions asks with regard to the penny scheme, "The fractions of a penny would be written "as fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. Is this a disadvantage?" In answer to this, Professor De Morgan says, "The "mere halving of the lowest coin is no disadvantage. "It can be done in a decimal system, and it will be "done when convenient; nothing proposed in the "question is either impossible to decimalists or "repudiated by them. But it is an abiding delusion "of the opponent of decimals that he will suppose "the decimalist to be under contract never to use a "common fraction. The language of some advocates "of decimals is calculated to foster this delusion. "Their phrases would almost make one think that "decimals are upheld as ethically right rather than "as technically convenient. This is always the case "in discussion. Matters of practice become matters "of doctrine on both sides. So on one side we "sometimes find a morbid exclusion of the common "fraction, and on the other side we hear the taunt, "You are departing from the decimal principle."

Sir J. F. W. Herschel says, "I consider it an

"enormous disadvantage. It is no less than a tacit "abrogation of the decimal system."

Professor Miller answers, "Yes, a great dis- "advantage. Each of the sums $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, consists of "three separate marks equivalent in trouble to three "figures."

Dr. Peacock's answer is remarkable:—"Cer- "tainly not. But why write them as fractions if your "units, whether of coins or account, are sufficiently "low? The rea in Portugal is really a coin of "account, and so to a certain extent is the cent in "France, but in poor countries lower coins are re- "quired than in ours. With respect to the half-cent "in the United States it is used as a mark merely, "which is at once translatable into five mils, or the "corresponding ·5 of a cent."

The answer of Mr. Snowden of the United States Mint is also remarkable:—"There is no special dis- "advantage in writing by vulgar fractions the parts "of the smallest coin. To diminish the necessity of "expressing fractions at all, the smallest coin (unit?) "should not be taken at too great a value, which the "penny probably is."

The last two answers are instructive as much for what they omit as for what they include. Neither adverts to the advantage of the double minimum, on which the advantage of this ultimate binary division depends. Portugal, cited by Dr. Peacock, is really an instance of the tendency to a binary division in a coinage nominally decimal, and America, to which he refers, is strictly in point as furnishing an instance of an express binary subdivision of the lower unit.

This consideration shows one of the greatest advantages of the present and of the penny scheme of decimal coinage over the £ and mil, though it is remarkable that some of the advocates of the penny and other schemes, having a lower unit of nearly equal value, propose to divide that unit decimally.

3. *Number of units.*

Our present coinage has three units corresponding to the three metals—gold, silver, copper—used in our coinage.

It appears to me that the fourth unit of the £ and mil scheme is a serious disadvantage.

Connected with this is the fact of there being in the £ and mil system 1,000 steps between the highest and lowest unit, whilst in all the complete decimal coinages actually in use there are only 100 such steps, which is one of the disadvantages of the £ and mil scheme.

This disadvantage may, however, easily be over-estimated. It is met and greatly diminished by that property of a decimal coinage, already adverted to, which admits of any sum without alteration of figures or mental effort being considered as expressed in any one or more of the units. The particular form in this respect which the £ and mil system would adopt can only be decided by experience. I have very little doubt that cents—as dimes in America and decimes in France—would drop out of use, but that florins would be retained, and that thus practically not more than 100 steps would enter into mental conception. For paper calculations there is no difference as regards convenience between 100 and 1,000 steps. The principal objection to 1,000 steps between the highest and lowest unit of a decimal coinage appears to me to depend on the other considerations already adverted to, viz., the inconvenient size and value of the units which it causes.

4. *The mutual relation of the units considered with regard to other purposes than calculation.*

The numerical relations of the units are not only important in the highest degree as well for paper as for mental calculation, but are important in a less degree in other respects, and particularly for expressing and paying prices of broken quantities of material things. For all such purposes what is most important in the relation of the several steps is, that the steps should have as many binary and other factors as possible. The first are obtained in our coinage by having the number 2 introduced twice as a factor at each step, the second by having the two next lowest prime numbers 3 and 5 introduced as factors, giving us to express the mutual relations of our units the table contained in the 39th of Lord Overstone's questions.

Table of factors of the number of each unit of the present coinage contained in the next superior unit.

Farthing	2×2	$2\times2\times2\times2\times3$	$2\times2\times2\times2\times3\times2\times2\times5$
	Penny	$2\times2\times3$	$2\times2\times3\times2\times2\times5$
		Shilling	$2\times2\times5$
			Pound.

To the question whether the system having such factors does not fulfil to a greater degree than any other possible system some of the requirements of a coinage pointed out in the previous question, and whether it could be considered as accidental or unscientific the following answer is given by Sir J. Herschel:—"Whatever be the demerits of this state- "ment as an argument against the decimal system "it must be allowed in a pre-eminent degree the merit "of ingenuity. It would be perfect as an argument, "and would suffice to convince every one of the abso- "lute perfection of the £ *s. d.* system of reckoning, "if only two things were granted, viz:—

Ans. p. 112.

"1st. That the human intellect stands in a definite "relation to the scale of its pecuniary transac- "tions, beginning with the meanest capacity capable "only of binary arithmetic as corresponding to the "lowest stage of purchasing power, and proceeding "upwards by successive enlargements of idea to that "degree of worldly well-being which admits the occa- "sional handling of a gold piece; and,

"2ndly. That there are no necessities of our nature "which require us to take in a larger and more "general conception of number, and which feel these "narrow restrictions as a series of stumbling blocks "interrupting the continuity of progress. It is pos- "sible to insist beyond what is fair and reasonable "on the advantages the £ *s. d.* system confers or is "supposed to confer on the very lowest and least "educated classes. The middle classes (all between "the nobility and the day labourer) also call for con- "sideration. It is especially desirable (looking to "the yearly increasing importance of those classes) "that they should have no unnecessary obstacles

"thrown in the way of their educational improve-
"ment, and of their acquiring clear and comprehen-
"sive views of general commerce and finance."

In answer to the same question Professor De Mor-
p. 51. gan says, "A true account is given of the factors
"which the common system contains. But it does
"not fulfil the requirements of a system of coinage
"so well as the decimal system, and that by a very
"great deal. It is neither accidental nor wholly
"unscientific for its day. But our affair is with
"its comparative not its absolute merit."

p. 167. On the same question Mr. Snowden remarks, "The
"coinage system of Great Britain is a combination
"in one system of the quaternary, the duodecimal,
"and the vigintesimal notations. Practice may make
"it endurable, but I certainly deem it unscientific,
"unless our decimal coinage be conceded a failure."

Professor Kelland says, "Our present system
"of coinage, whether accidental or otherwise, is
"certainly constructed in a most systematic manner.
"* * Nothing can exceed this for systematic sim-
"plicity. Each of the first three prime numbers
"(1, 3, and 5) is multiplied by 4, and that is all."

A singular answer is given by one of the ablest
advocates of the decimal coinage, the late Dr. Peacock,
ns. p. 144. "It is the factor 3 amongst the divisors of the
"shilling which totally upsets the uniformity of the
"system, and leads to indefinite decimals." This answer was probably penned hastily, for the writer attributes to the presence of 3 as a factor in the present system, one of the disadvantages of the want of 3 as a factor in a decimal system; that is to say, he (Dr. Peacock) objects, as giving rise to indefinite decimals, to that feature of our present coinage which prevents indefinite decimals in the cases to which he refers, and the want of which feature in decimal coinages gives rise to indefinite decimals in the same cases. This was probably a mere oversight, but it perhaps deserves to be pointed out.

Of the answers from which I have quoted it may be observed, that Sir John Herschel and Professor De Morgan admit the merits of the present coinage in the points raised in the question, though asserting the superiority of a decimal coinage in others, a superiority which I do not dispute; while Mr. Snowden, accustomed to a decimal coinage, considers that system as only made endurable by practice which we find so convenient, and which Professor Kelland considers as "unsurpassed in systematic simplicity."

5. *The convenience of the intermediate coins.*

That our present system furnishes very convenient intermediate coins, and that nothing will in that respect be gained by the adoption of a decimal coinage, will probably not be disputed. The particular difficulties which it appears to me there will be in the selection of coins in the £ and mil scheme will be more conveniently considered in the sequel, when I come to consider the particular mode in which the change to that system from the present would be made.

6. *Convenience for account keeping, not involving calculations.*

If all sums between ¼*d.* and £1, and between 1 mil and £1, were of equally frequent occurrence, there would be no doubt that they could be most briefly written down in the common arithmetical or decimal notation. But if some sums are of much more frequent occurrence than others, then something is gained by shortening the expression of the more frequent sums, even at the expense of lengthening the expression of the less frequent. This is done in our present coinage. Halfpence occur so seldom, and farthings so very seldom, that we can afford to express them in an exceptional and fractional form for the sake of the advantage of a more brief expression of sums in which they do not occur. Hence, although sums expressed to farthings require more figures than sums expressed to mils, sums expressed to pence require fewer. It has indeed been proposed that in banking, commercial, and trading accounts, sums shall only be written to 5 mils. But in this there is a difficulty which will be more conveniently considered when I come to consider the mode in which the change to the £ and mil system would be made. The advantage does not appear to be great on either side.

I now come to what is by far the most important part of the question—the transition, and will consider, confining myself to the £ and mil scheme,—

1. How the change would be made.
2. The difficulties of making it.

1. *How the change from the present to the £ and mil scheme would be made.*

The essence of the change is to replace our present copper coinage by a copper coinage 4 per cent. less in nominal value.

I do not propose to go into the question of the mode in which the physical part of the change would be made, whether by issuing a new bronze coinage, and calling in the present copper coinage, or by lowering the value of the present copper coinage. It does not appear to me that in either way, or in other ways which might be suggested, the difficulty would be great.

Assuming that this part of the change can be made without difficulty, the change amounts to this, that the value of the copper coinage shall be altered so that there shall be 12½*d.* instead of 12*d.* in the shilling, and that all sums *may* in all cases, and *must* in certain cases, be written in florins and farthings, instead of in shillings and pence.

This will not, of course, be the precise form of the legislative enactment, but it must be equivalent to it, and it seems to me inevitable that this would be the form in which the change would present itself to the mind of the people of England.

It is convenient to contemplate the change from this point of view for another reason, viz., that if the maximum of advantage to be gained from the change is to be seen by considering sums as expressed in florins and mils, or florins, cents, and mils, the maximum of disadvantage is to be seen by considering them as expressed in shillings, and in pence of 12½ to the shilling.

In some respects this division of the shilling into 12½ would not be much, if at all, less convenient than the present division.

Sums might still be written in £ *s. d.*, or in £ *s.* and *m.*, or £ *f.* and *m.*

Thus the same sums might be written at will either

£	£ s. m.	£ s. d.
1·999	1 19 49	1 19 12½
1·998	1 19 48	1 19 12
1·997	1 19 47	1 19 11¾
5·994	5 19 44	5 19 11

The principal change is, that in the pence column, instead of taking out the 12, we must take out the 12½; but this is little, if at all, more difficult. It requires the multiplication table of 12½ to be learned; but this is probably quite as easy as the multiplication table of 12, as it has the advantage of going up to 25, 50, and 100.*

* In New York the provincial currency was 8*s.* to the dollar, 12*d.* to the shilling. The change to 100 cents to the dollar represented itself to the popular mind as 8*s.* to the dollar, and 12½ pence to the shilling. I have been informed by an American scientific gentleman, that this mode of reckoning still remains, and that in particular his own household accounts are kept by his less scientific lady in dollars, shillings, and pence; that in adding she adds up the pence column, takes out the 12½, and carries to the shilling column; adds up the shilling column, takes out the 8, and carries to the dollar column, and then adds the dollars. If this be done in New York seventy years after the introduction of the decimal system, how long may we expect it to remain as one of our habits?

2. *'Difficulties of making the change.*

A difficulty so serious that I do not see how it is to be got over is this:

Inasmuch as after the change is made sums may still with little additional inconvenience be written in £ *s. d.*, and inasmuch as the mental conception of sums so written will to all the present generation, and probably to some generations to come, be more easy than that of £ *f.* and *m.* (each sum so expressed requiring a mental or other translation into £ *s. d.* before it is apprehended), how is the community to be induced to write, speak, and think in florins and mils, instead of in shillings and pence? This is a question to which I do not see the answer. The great majority of the community who have no money calculations, or none but the very simplest, to make, would not experience the benefit to be derived from the decimalization of the coinage, but would experience in its full force those inconveniences which arise from the expression of sums in a new language requiring interpretation before it is understood, and to them the change would be an increase of trouble.

There is an apparent paradox, but a real truth, in asserting that the more easy the change is the more difficult it is. The explanation is this, that the more easy to make the change from our present to a new coinage, the more easy, when the change is made by law, to retain or to revert to the old.

The decimal system, the introduction of which would in other respects be most easy, viz., the penny system would on this account be perhaps the most difficult of introduction, and the mechanical difficulties in the introduction of the £ and mil scheme have at least this advantage, that if the change were made they would make it impossible to retain or revert to the old system.

The difficulties of which I have been hitherto speaking may be called the *moral* difficulties in the way of the introduction of the £ and mil coinage, but the more tangible and what may be called the *mechanical* difficulties which I have last adverted to are serious. These arise from the impossibility of expressing in the new coinage any sum expressed in the present coinage, except 6*d.* and its multiples.

This difficulty will be felt in different degrees in different matters, which we may classify thus:—

1. Payments of sums under 6*d.* fixed by law and made by individual to individual, as turnpike and bridge tolls.
2. Like payments, but made by individuals to the State, as receipt and postage stamps.
3. Payments of considerable sums fixed by the penny, and whether fixed by law or by custom, as customs, income tax, railway fares and tonnage, the pay of the army and navy, trade prices, &c.
4. Prices fixed not by law but by convenience and competition—shop prices of small articles, steamboat and omnibus fares, &c.
5. The coins of the £ and mil scheme.

These different cases present difficulties of very different magnitude, and which must be overcome in different ways.

1. The first appears to offer the greatest difficulties. Had the commission been prepared to recommend the adoption of the £ and mil scheme, it would have been proper to investigate the extent of the difficulty, and to suggest the best mode of meeting it.

In all cases in which the person or body levying the toll has an option of raising or lowering it, no provision might be necessary.

In cases in which the maximum toll is at present levied some legislative provision for compensation would probably be necessary. I am not prepared to say what that should be.

2. In this case the difficulty is less. It is in the power of the legislature to raise or lower the tax. Postage stamps must be lowered to 4 mils or raised to 5; but as the penny was originally selected simply because it was a convenient price in the existing coinage, the alteration to the most convenient price in the new coinage cannot, it appears to me, be a matter of much difficulty. It is sometimes said that by the change either individuals or the government must lose. It may with equal truth be said that by the change either individuals or the government must gain, and I cannot think that the difficulty of making the change is serious.

3. These difficulties, when boldly faced, appear to me to amount to little.

The utmost to which the difficulty can amount in any case is this: that for a certain time after the change of coinage it may be necessary to make calculations and keep accounts in the old currency, and to make payments in the new. The necessity of continuing for certain accounts the use of the present system could not be felt as a great inconvenience by the opponents of a change, nor as insuperable by the advocates of a change. Even this might in many cases be avoided. Thus in railway fares and tonnage it would only be necessary that new tables of the fares and rates from station to station should be issued.

4. On this point I am unable to agree with much of what has been urged by the opponents of the £ and mil scheme.

In the prices referred to there is at present nothing fixed, or perhaps it would be more correct to say there is always something variable, either price, quantity, or quality, which causes and allows a perpetual adjustment to be made between the buyer and the seller.

5. The last difficulty to which I will refer is one already adverted to, viz., the coins of the £ and mil system.

In this it will be desirable to begin by a few general considerations on the intermediate coins of a decimal coinage.

The ratio of the values of such intermediate coins should be as near that of 2 : 1 as possible, and since $10 = 2 \times 2 \times 2\frac{1}{2}$, the coins between 1 mil and 10 mils may be either

$$1 \cdot 2 \cdot 4 \cdot 10 \quad - \quad (1)$$
$$1 \cdot 2 \cdot 5 \cdot 10 \quad (2)$$
$$1 \cdot 2\tfrac{1}{2} \cdot 5 \cdot 10 \quad - \quad (3)$$

according as the factor $2\frac{1}{2}$ comes in the 3rd, 2nd, or 1st place.

Between 10 and 100 there may be a like division, giving

$$10 \cdot 20 \cdot 40 \cdot 100 \quad (4)$$
$$10 \cdot 20 \cdot 50 \cdot 100 \quad - \quad - \quad (5)$$
$$10 \cdot 25 \cdot 50 \cdot 100 \quad - \quad - \quad (6)$$

With these intermediate coins the relation of any coin to the next but one will be either 4 : 1, 5 : 1, or $6\frac{1}{4}$: 1, the last of which must be excluded if possible.

If we consider the series of coins between the mil and the cent, viz., (1), (2), and (3), the series (3) must be excluded as involving a $\frac{1}{2}$ mil. Between (1) and (2), that is between a 4 mil and a 5 mil piece, there are great difficulties in deciding. Considering how firmly rooted the penny is in our prices and ideas, it appears hardly doubtful that a 4 mil-piece must take the place, and probably the name of the penny.

If we consider only the coins between the cent and the florin, there cannot be a question that the shilling —50 mils—must be included. This excludes (4.) The question is then between a 20 and 25 mil piece, and here there can be little doubt that the 6*d.*—the 25 mil piece—would not be surrendered without a struggle. Our present habits would therefore induce us to prefer the 4 mil piece to the 5, and the 25 mil piece to the 20, giving the series from the mil to the florin, 1. 2. 4. 10. 25. 50. 100. But unhappily, the 4 mil piece and the 25 mil piece have to each other the fatal proportion of 1 to $6\frac{1}{4}$. And the inconvenience which would arise may be estimated by supposing with our present coinage—everything else remaining the same—the sixpence and shilling to become $6\frac{1}{4}d.$ and $12\frac{1}{2}d.$ The difficulty which there would be in paying sums

under 6*d.* with a silver coin of 6¼*d.* appears to me to put this relation of coins out of the question. The result seems to me to be inevitable. We must either give up the penny or the sixpence, or (which theoretically would give the best series of coins) we must give up both. I cannot think the people of England would be easily reconciled to any of these alternatives.

Were the 5 mil coin to be adopted, the inconvenience as regards the lower coinage would be the same as that of substituting a coin of 5 farthings for a penny in our present system, or of dividing the penny into ⅖ and ⅗, instead of into ½ and ½. I cannot imagine that either would be otherwise than inconvenient. These difficulties are an answer to two of the suggestions referred to in the foregoing part of these observations, viz. :

1. That pieces of 2 and 4 mils give, in another form, the advantages to be derived from a binary division of the lowest mil.

2. That in commercial and trading accounts 5 mils might be the lowest sum entered, as the penny at present.

As regards the first, the difficulty is that the 4 mil piece is incompatible with the sixpence. As regards the second, that whatever may be done in bankers' and large commercial accounts, the same arrangement cannot be made in shop accounts of articles the prices of which are governed by the 4 mil piece.

I have already referred to the difficulties which occur in several of the existing decimal coinages, at the point at which the decimal division of the upper part of the series encounters the tendency to binary division in the lower.

In America the quarter dollar, which is the most common silver coin, taking the place of our shilling, has by law no binary division at all. It consists of 25 cents. Its half consists of 12½ cents, and a Spanish coin current for this value, under the denomination of the York shilling, is or was till lately in common use, although whenever a number of cents had to be paid by giving a "shilling," and receiving change, there was a loss of a half cent, and the half of the quarter dollar is now in general taken at 13 cents.

In the French coinage the difficulty is in the sub-division of the sou into ⅖ and ⅗. I cannot doubt that for all purposes, except paper calculations, a coin of 2½ centimes would be more convenient.

These observations, if well founded, enable us to form an estimate of the merits of the several schemes proposed for a decimal coinage which are based on the present coinage, and which are represented in the following table :—

Designation of Scheme from its relation to the present Coinage.	Value in present Money of the several Units.								
	d.	*s.*	*d.*	*s.*	*d.*	£	*s.*	*d.*
Pound and mil -	0·24	0	2,4	2	0	1	0	0
Farthing - -	0·25	0	2·5	2	1	1	0	10
Halfcrown - -	0·3	0	3	2	6	1	5	0
Four-shilling -	0·48	0	4·8	4	0			
Halfpenny - -	0·5	0	5	4	2			
Crown - - -	0·6	0	6	5	0			
Eight shilling -	0·96	0	9·6	8	0			
Penny - -	1	0	10	8	4			
Ten-shilling - -	1·2	1	0	10	0			
Twenty-penny - -	0·2	0	2	1	8			
Guinea - - -	0·252	0	2·52	2	1	2	1	0

In discussing the merits of these several schemes, it is necessary to distinguish between merits depending on the relation of the scheme under consideration to the present coinage, and which I will call *relative* merits, and merits independent of that relation, which I will call *absolute* merits.

Of the first three groups, it is to be observed that the several schemes in each group have nearly the same absolute merit, and differ from each other in relative merit, and that in absolute merit the first group is inferior to the second and to the third. The second and third groups seem to me to be nearly equal in absolute merit.

With regard to relative merits, if we compare the first two schemes, viz. the pound and mil and the farthing schemes with each other, we see that the question is between abandoning the £ and abandoning the penny. The half-crown scheme may be left out of consideration, for although it has a slightly better relation to the penny than the £ and mil scheme, it has a much worse relation to the £ ; and, although it has a slightly better relation to the £ than the farthing scheme it has a much worse relation to the penny. Between the farthing and the £ and mil schemes, public opinion has decided that the £ must be retained.

Between the schemes of the second group, the four-shilling scheme and the crown scheme have rather more convenient relations to the £ than the halfpenny scheme, and the crown scheme has in addition a more convenient relation to the shilling, but they both sacrifice the £ without retaining a commensurable relation with the penny, and I think there can be no hesitation in preferring the halfpenny scheme to either.

Similar remarks may be made of the several schemes of the third group. Of these for the like reasons the penny scheme is undoubtedly to be preferred, although each of the others, and particularly the ten-shilling scheme, is, in some respects, superior.

The twenty-penny and guinea scheme may, in absolute merit, be ranked with the schemes of the first group, but the guinea scheme is clearly inferior to the farthing scheme in relative merit.

The twenty-penny scheme is an ingenious device, having a lower unit an aliquot part of the penny, and an upper unit an aliquot part of the £. It does not, however, wholly get over the difficulty as to the lower unit, for though commensurable with the penny, it is incommensurable with the halfpenny. In absolute merit it ranks only with the schemes of the first group.

The question, then, is reduced to that between the £ and mil scheme, on the one hand, and the penny or halfpenny scheme, on the other ;—the penny and halfpenny schemes having greater absolute merits, but having the great relative demerit that they abandon the £ and the shilling ; having the great mechanical difficulties that they require the calling in of the whole of our gold and silver coinage; having in other respects no mechanical difficulties, but having very great, perhaps insuperable, moral difficulties ; — the £ and mil scheme, with less absolute merit, but with great relative merits,— having no mint difficulties,—having greater mechanical difficulties in other respects, but none that are insuperable, and having fewer moral difficulties. Between these coinages public opinion has, I think, decided, and probably rightly, in favour of the £ and mil scheme, as compared with any other decimal scheme.

The conclusions to which I have been led by these and other considerations are—

1. That although a good non-decimal coinage has some advantages which no decimal coinage can possess, still on the balance of *absolute* merits and demerits, and leaving out of account all transitional difficulties, any decimal coinage is superior to any non-decimal coinage. That this is the case even when weights and measures are non-decimal.

3. That our present system is the best possible non-decimal system, and that its only defect is its being non-decimal.

2. That the £ and mil scheme, though not the best possible decimal scheme, is the only practicable decimal scheme.

4. That as between the present and the £ and mil, in every quality, except those which depend on the relation between the units being that of common arithmetic, the advantage is on the side of our present coinage; our present coinage having some advantages which no decimal coinage can possess, and others, which the £ and mil scheme does not possess.

5. That as regards the transitional difficulties, those which have been called mechanical are limited and temporary, and not of great importance.

6. That those which have been called the moral difficulties are of much greater importance, and much more enduring. That when the Legislature has done all that it can do, the coinage would not, with the great mass of the people, be decimal for many years, but would continue to be a mixed system considerably less convenient than the present.

7. That it is not practicable or advisable, so long as weights and measures are not decimalized, to introduce the principle of decimal division into the coinage of the United Kingdom.

8. That if weights and measures were decimalized the question would present a very different aspect, and possibly might lead to a different conclusion.

A. S.

The following papers have already been presented to both Houses of Parliament by command of Her Majesty, but are here reprinted for convenience of reference :—

LETTERS PATENT.

Victoria, by the Grace of God of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith. To Our right trusty and well beloved Councillor Thomas Spring Lord Monteagle of Brandon, Our right trusty and well beloved Samuel Jones Lord Overstone, and Our trusty and well beloved John Gellibrand Hubbard, Esquire, greeting. Whereas We have deemed it advisable for divers good causes and considerations that a Commission should forthwith issue to inquire into the expediency of introducing the principle of Decimal Division into the Coinage of Our United Kingdom: Now know ye, that We, reposing especial trust and confidence in your approved wisdom and fidelity, have assigned, nominated, and appointed, and by these presents do assign, nominate, and appoint you, the said Thomas Spring Lord Monteagle of Brandon, Samuel Jones Lord Overstone, and John Gellibrand Hubbard to be Our Commissioners for considering how far it may be practicable and advisable to introduce the principle of Decimal Division into the Coinage of Our United Kingdom. And We do by these presents give and grant unto you Our said Commissioners, or any two of you, full power and authority to inquire of and concerning the premises by all lawful ways and means whatsoever, and to call before you or any two of you such persons as you shall judge necessary by whom you may be the better informed of the truth in the premises. And We do also give and grant unto you, or any two of you, full power and authority, when the same shall appear to be requisite, to administer an oath or oaths to any person or persons whatsoever to be examined before you, or any two of you. And We do by these presents require and command you, Our said Commissioners, or any two of you, to report to Us in writing under your hands and seals all and every your proceedings by force of these presents, and your opinions touching and concerning the premises. And We do by these presents declare and ordain that this Our Commission shall continue in full force and virtue, and that you Our said Commissioners, or any two of you, shall and may from time to time proceed in the execution thereof, although the same be not continued from time to time by adjournment. And We do by these presents require and command all and singular Our officers and ministers, and all other Our subjects whatsoever, to the aiding and assisting to you and each of you in the execution of this Our Commission. And for your further assistance in the execution of these presents We do hereby authorize and empower you to appoint a Secretary to this Our Commission, whose services and assistance We require you to use from time to time as occasion may require. In witness whereof We have caused these Our Letters to be made Patent. Witness Ourself at Westminster, the first day of November, in the nineteenth year of Our reign.

By Warrant under the Queen's Sign Manual.

C. Romilly.

(Great Seal.)

PRELIMINARY REPORT.

To the Queen's Most Excellent Majesty.

We, Your Majesty's Commissioners for considering how far it may be practicable and advisable to introduce the principle of Decimal Division into the Coinage of the United Kingdom, humbly offer to Your Majesty this our First and Preliminary Report :—

Before entering upon the different heads of the inquiry, it was important to consider and define the precise subject referred to us by Your Majesty, and as a preliminary matter to trace the progress of the question of Decimal Coinage, and to ascertain the position in which it had been left at the time of the issuing of the Commission.

The question of a Decimal scale, though only as regards weights and measures, came under the consideration of a Royal Commission appointed in the year 1816, "to consider how far it might be practi-
" cable or advisable to establish a more uniform
" system of weights and measures." The Commissioners were Sir Joseph Banks, President of the Royal Society, Sir George Clerk, Mr. Davies Gilbert, Dr. Wollaston, Dr. Thomas Young, and Captain Kater. Their first report, presented in 1819, contained the following recommendation :—

"The subdivision of weights and measures at present
" employed in this country appears to be far more con-
" venient for practical purposes than the Decimal scale,
" which might perhaps be preferred by some persons for
" making calculations with quantities already determined.
" But the power of expressing a third, a fourth, and a
" sixth of a foot in inches, without a fraction, is a peculiar
" advantage in the duodecimal scale; and for the opera-
" tions of weighing and of measuring capacities the con-
" tinual division by two renders it practicable to make up
" any given quantity with the smallest possible number of
" standard weights or measures, and it is far preferable in
" this respect to any Decimal scale. We would therefore
" recommend, that all the multiples and subdivisions of
" the standard to be adopted should retain the same
" relative proportions to each other as are at present in
" general use."

In 1824 the late Sir John Wrottesley, afterwards Lord Wrottesley, brought before the House of Commons a motion for inquiring into the applicability of the Decimal scale to coins. The mover stated that he had no intention of proposing any change in our gold or silver coins. He referred to the example of

France, of the United States, and of China, and described the change he advocated as the substitution of a simple for a complex system of account. The coins recommended by Sir John Wrottesley were pounds, double shillings, and farthings, the last having 4 per cent deducted from their present value, making 100 farthings = 1 double shilling, and 1,000 farthings = 10 double shillings = 1 pound.

The Master of the Mint, Mr. Wallace, afterwards Lord Wallace, on the part of the Government, opposed the motion on the ground of the inconvenience which might attend its adoption. He stated, however, that he did not deny the advantages of the plan. The motion was withdrawn, a pledge being given (which was carried into effect by the 6 Geo. IV., c. 79) that the currencies of Great Britain and Ireland should be assimilated.

In consequence of the destruction of the standards of weight and measure in the fire which destroyed the Houses of Parliament, Commissioners were appointed in May 1838, to whom the question of the restoration of the standards was referred by Lord Monteagle, then Chancellor of the Exchequer. These Commissioners were, G. B. Airy, Astronomer Royal, Francis Baily, President of the Royal Society, J. E. Drinkwater Bethune, Sir J. F. W. Herschel, Bart., Sir J. G. Shaw Lefevre, Sir J. W. Lubbock, Bart., the Very Rev. George Peacock, Dean of Ely, Lowndean Professor of Astronomy, and the Rev. R. Sheepshanks.

These Commissioners made a report on the 21st December 1841, containing the following statement:—

"The first point which has called for our special notice " is, the general question of Decimal scale. In intro- " ducing this subject we beg leave to invite the attention of " the Government to the advantage and the facility of " establishing in this country a Decimal System of Coinage. " In our opinion no single change which it is in the power " of a Government to effect in our monetary system would " be felt by all classes as equally beneficial with this, when " the temporary inconveniences attending the change had " passed away. The facility consists in the ease of inter- " posing between the sovereign (or pound) and the shilling " a new coin equivalent to two shillings (to be called by a " distinctive name); of considering the farthing (which " now passes as the $\frac{1}{240}$th part of the pound) as the " $\frac{1}{1000}$th part of that unit; of establishing a coin of value " equal to $\frac{1}{100}$th part of the pound, and of circulating, " besides these principal members of a Decimal Coinage, " other coins of values bearing a simple relation to them, " including coins of the same value as the present shilling " and sixpence. We do not feel ourselves at liberty further " to enter into this subject, but we have felt it imperative " on us to advert to it, because no circumstance whatever " would contribute so much to the introduction of Deci- " mal scale in weights and measures in those respects " in which it is really useful as the establishment of a " Decimal Coinage."

In the year 1843 a second Commission was appointed for the same purposes as those which had been contemplated in the appointment of the Commission of 1841. It included the names of the Astronomer Royal, Sir J. F. W. Herschel, Sir J. G. S. Lefevre, Sir J. W. Lubbock, the Dean of Ely, and Mr. Sheepshanks, members of the former Commission, with whom were associated the late Marquis of Northampton, President of the Royal Society, the Earl of Rosse, Lord Wrottesley, and Professor Miller. The report of this Commission referred to and proposed to carry out the recommendations which we have quoted of the report of 1841.

On the 27th of April 1847 the question was brought before Parliament by a motion made in the House of Commons by Sir John Bowring, for an Address to the Crown in favour of the coinage and issue of silver pieces of the value of $\frac{1}{10}$th and $\frac{1}{100}$th of the pound sterling, avowedly as a step to the complete introduction of a Decimal division of the pound.

The Chancellor of the Exchequer, Sir Charles Wood, stated that the first step in the adoption of such a system was to establish a coin $\frac{1}{10}$th of a pound sterling. To strike a two-shilling piece he had no objection.

The motion was withdrawn on the understanding that a silver piece of the value of $\frac{1}{10}$th of the pound sterling should be coined and issued. This engagement was afterwards carried into effect by the issue of the florin.

On the 26th of March 1853 the Commissioners who had been appointed in 1843 addressed a letter to Mr. Gladstone, then Chancellor of the Exchequer, in which they stated, that "they felt it their duty to " represent that they were strongly impressed with " the advantages of a Decimal System of Coinage, " and that having learnt that an immediate coinage " of copper to a considerable amount was in con- " templation, they made an urgent request, that, " before specific steps were taken in reference to the " proposed coinage, the Decimal System might be " carefully considered, trusting that the result would " be that the Government would decide on issuing " coins related to the millesimal subdivision of the " pound." They suggested "that coins of the value " $\frac{1}{1000}$th, $\frac{2}{1000}$th, and $\frac{4}{1000}$th of a pound (differing " little from the farthing, the halfpenny, and the " penny,) might be extensively used by the public " without present inconvenience, while the inscrip- " tion of their values, as estimated in the Decimal " scale, would afford the means of shortly intro- " ducing that scale throughout the entire system." This letter was signed by the Astronomer Royal, the Earl of Rosse, then President of the Royal Society, Lord Wrottesley, now President of the Royal Society, the Dean of Ely, Sir J. W. Lubbock, Sir J. G. S. Lefevre, the Rev. R. Sheepshanks, and Professor Miller.

On the 5th of April 1853, in answer to an inquiry made in the House of Commons, whether it was the intention of Government to carry out the system of Decimal Coinage, and whether it was intended to issue the new copper coinage on a Decimal basis, Mr. Gladstone, then Chancellor of the Exchequer, stated "that there " was no intention on the part of the Government " to make any change with respect to the copper " coinage. With respect to the general question of " a Decimal Coinage the Government were fully " sensible of the great importance of it, and they " likewise felt that the utmost attention was due to " the arguments and opinions of those who had re- " commended the change; but the Government were " also of opinion that the matter was one of great " importance, and of great delicacy as well as import- " ance, and that the altering of the value of those " particular coins, which are in point of fact the " measures of value and the basis of the whole idea " of value of the mass of the people, was a very " serious matter indeed, and one which ought not to " be undertaken on any mere abstract opinions and " considerations without fully ascertaining that the " ground under foot was secure. The course which " would be taken by the Government was this:—An " Honourable Member had lately given notice of a " motion for the appointment of a Select Committee " to inquire into the subject, and the motion would " receive the support of Government, for it would " lead to such an elucidation of the matter as would " enable the Government and the House to form a " conclusive judgment on the subject."

Accordingly, on the 12th of April 1853, on the motion of Mr. W. Brown, M.P. for South Lancashire, and with the concurrence of the Government, a Select Committee was appointed to take into consideration and report to the House the practicability and advantages or otherwise that would arise from adopting a Decimal System of Coinage.

It appears that the entire subject of decimalizing moneys, weights, and measures, had been at first included in the notice of motion for the Committee, but that the question of weights and measures had been withdrawn from the notice at the suggestion of Mr.

Gladstone, who was of opinion that it would be more advisable for the present to fix attention upon the single object of coins and accounts.

The witnesses examined by the Committee, twenty-five in number, were all in favour of the introduction of a Decimal Coinage, and all, except T. E. Headlam, Esq., M.P. for Newcastle, in favour of the particular scheme which had been recommended by the Commissions of 1841 and 1843, and which is known as the Pound and Mil Scheme.

The Committee reported to the House of Commons on the 1st of August, 1853.

The recommendations of the Committee were in substance identical with the propositions made in the House of Commons in 1824 and 1827, and with the recommendations of the Commissioners of 1838 and 1843.

The report stated, that "with regard to the inconveniences of the existing system the evidence was "clear and decided. That system was shown to "entail a vast amount of unnecessary labour, and "great liability to error, to render accounts needlessly "complicated, to confuse questions of foreign exchanges, and to be otherwise inconvenient. On "the other hand, the concurrent testimony of the "various witnesses was to the effect that the adoption of a Decimal System would lead to greater "accuracy, would simplify accounts, would greatly "diminish the labour of calculations (to the extent "of one half, and in some cases four fifths, according "to Professor De Morgan, who had made the question his especial study), and, by facilitating the "comparison between the coinage of this country and "other countries that have adopted the Decimal "System, would tend to the convenience of all those "who are engaged in exchange operations, of travellers, and others. An important benefit would be "derived in several departments of the public service, "and in every branch of industry, from the economy "of skilled labour which would result from the proposed change; at the same time that the education "of the people generally would be much facilitated "by the introduction into our schools of a system so "directly calculated to render easy the acquirement "of arithmetic."

The Committee recommended the pound sterling as the unit of the new system of coinage. "Considering "that the pound is the present standard, and therefore associated with all our ideas of money value, "and that it is the basis on which all our exchange "operations with the whole world rest, any alteration "of it would lead to infinite complication and embarrassment in our commercial dealings; in addition "to which its retention would afford the means of "introducing the Decimal system with the minimum "of change."

The Committee recommended the withdrawal of the half-crown, the 3*d*. and 4*d*. pieces, and the introduction of copper coins of one, two, and five mils, and silver coins of ten and twenty mils.

The Committee summed up their recommendations in the following words:—

"In conclusion, your Committee, having well weighed "the comparative merits of the existing system of coinage "and the Decimal System, and the obstacles which must necessarily be met with in passing from the one to the other, "desire to repeat their decided opinion of the superior "advantages of the Decimal System, and to record their "conviction that the obstacles referred to are not of a "nature to create any doubt of the expediency of introducing that system as soon as the requisite preparations "shall have been made for the purpose by means of "cautious but decisive action on the part of the Government."

The publication of the Report of the Parliamentary Committee is an era in the history of the progress of the question of the introduction of a Decimal Coinage in the public mind. It excited much discussion in newspapers, pamphlets, and other publications, as well as in the deliberations of public meetings and learned bodies; and not only the existing system and the scheme proposed by the Parliamentary Committee, but a variety of other schemes, which will be found in the synoptical table which forms part of the Appendix to this Report, found able and zealous advocates.

It is not consistent with the object of the present Report to enter into the discussion of the relative merits of the schemes so proposed, but it may not be considered inconsistent with it to point out that while each scheme claims, and perhaps with justice, in some one or more points advantages over the others, that all the schemes, except the Pound and Mil Scheme, abandon our present principal unit, the pound sterling, as one of the chief monetary units,—that the Pound and Mil Scheme, which retains the pound as the principal unit of account, sacrifices the exact expressibility of the penny, halfpenny, and farthing in the proposed new coinage, and that of the other schemes, all, except the Penny, Halfpenny, and Farthing schemes, abandon the pound sterling as a unit of account, as well as sacrifice the exact expressibility of the present penny, halfpenny, and farthing in the proposed coinage.

Of these schemes the Penny Scheme appears to be, on the whole, the principal rival of the Pound and Mil Scheme in the number, the ability, and the zeal of its advocates.

In June 1854 an association was formed, under the name of the Decimal Association, with the object of promoting the adoption of the Decimal System in money, weights, and measures.

To a deputation from this body, which, through Mr. Brown, their Chairman, urged on Mr. Gladstone, then Chancellor of the Exchequer, the immediate introduction of the Pound and Mil Scheme, Mr. Gladstone made the following observations, the importance of which may justify their introduction in this report:—

"I conceive that the intention of this deputation is that "of a public demonstration to awaken the country to a "proper consideration of the question. For, although it is "true that we have had Royal Commissions and Select "Committees of the House of Commons to inquire into "the subject, it has not, as I think, yet gone through anything near that process of sifting in public opinion that "would make it safe for the Government to take any decisive steps in regard to it. I cannot doubt that a Decimal "System of Coinage would be of immense advantage in "monetary transactions. The weight of authority on that "head is altogether irresistible; but I do not think, when "we come to the adoption of a system, that we have obtained sufficient evidence as to the sense and feeling of "the country with respect to it. It is true that those "people who have studied and paid attention to the question of a Decimal Coinage are unanimous in recommending it on account of the many advantages it possesses "over all other systems. Now, the people who have so "studied the question are gentlemen who have been more "or less actively engaged in commercial pursuits; but the "public at large do not seem to be acquainted with it. It "is, as you are aware, the enormous masses of the community who have immense business to transact that must "guide the Government in the matter. They are attached "to the present arrangement of the currency, as it admits "of the different systems of divisors, and is the basis of all "their notions of value. It has also many facilities of "division which you must lose if you abandon it. It is "impossible for you not to be struck with this—an advantage which takes its origin from the number of factors "which a combination of the decimal with the duodecimals "give rise to. With the Government it is impossible not "to be so struck. Again, it is so wound up in the habits "of the people, that it would not be advisable to have recourse to any change in it, unless we had clear evidence "that it was one the people themselves required and understood. This, too, is a question in which the mere judgment of a Minister is of no importance, and which the "general feeling of the public can alone decide. I frankly "own I am by no means convinced that you can get rid of "the penny; but as I said just now, nothing is more unimportant on such a question than the opinion of any "individual Minister. I would only ask you, are the people prepared for the change? All I say is, that I cannot "take any decisive step until we are satisfied that the subject has been thoroughly sifted, and is well understood

" by the public." Patience is never a good text to preach " upon, especially to men who have laboured and waited " long for the attainment of an object, and I can well " understand the feelings of Mr. Brown, who now expects " some fruit from his labours on this subject. I think that " so far as it has been discussed there has been a great deal " of opinion expressed in reference to it, but I do not think " from what I gather from the press that the feeling in " favour of it is so unanimous as you represent. I hope, " however, that those who are engaged in this movement " will persevere in their labours until they bring it fully and " fairly into the view of the public, when discussion will, I " hope, bring it to some practical result. As it is I feel " that we are not ripe for a decisive measure on the subject, " and I think that the aid of parliament should not be " invoked until we are ready for the change. When that " change may take place it will involve the re-adjustment " of tolls, and such matters; a process which, however im- " portant, is yet, when taken in connexion with the mea- " sure itself, a mere matter of manipulation. Again, we " must not lightly bring about a change which will take a " long time to work its way into the habits of the people; " for Sir John Herschel, no unfriendly witness, says that it " would require full twenty years to carry the contemplated " change into effect. Its perfect and full adoption by mer- " cantile men might be more immediate; for I agree with " Mr. Brown, that it would be regarded by them as a " labour-saving machine, and as such be quickly brought " into use; but it would, I am persuaded, take a very long " time before the people would become habituated to it."

To a deputation from the same body which was subsequently received at the Board of Trade, by Mr. Cardwell, then President of the Board of Trade, Lord Stanley of Alderley, and Sir James Emerson Tennent, Sir John Herschel, the Master of the Mint, being present, Mr. Cardwell, who had been a member of the Parliamentary Committee, made the following statement:—

" The Committee felt the advantage of obtaining the opi- " nions of practical and scientific men, and there was but one " opinion amongst them as to the advantages of the Decimal " System. There were, however, more opinions than one " as to the mode in which it was to be carried into effect, " and although we were very nearly unanimous in thinking " that the report we adopted contained the best plan that " could be proposed, yet there was a sufficient amount of " scientific and of educated opinion on the other side to " render it desirable that public opinion should be further " directed to the subject. Your inquiries are, therefore, " most valuable, as tending thoroughly to clear up the " subject, so as to procure general unanimity before any- " thing like transition is attempted. When you speak of a " Decimal Coinage to be established amongst the less edu- " cated portions of the community you must bear in mind " that it is desirable that they should be well prepared for " its introduction. You have to change a great number of " statutory contracts, postage, tolls, and railway fares."

On the 12th June 1855, Mr. W. Brown moved the following resolutions in the House of Commons:—

1. That in the opinion of this House, the initiation of the Decimal System by the issue of the florin has been eminently successful and satisfactory.
2. That a further extension of the system will be of public advantage.
3. That an humble Address be presented to her Majesty, praying that she will be graciously pleased to complete the Decimal scale, with the pound and florin, as suggested by two Commissions and a Committee of the House of Commons, by authorizing the issue of silver coins to represent the value of the one hundredth part of a pound, and copper coins to represent the one thousandth part of a pound, to be called cents and mils respectively, or to bear such other names as to Her Majesty may seem advisable.

After a protracted debate the first resolution was carried by a majority of 135 to 56. The second resolution was then carried without a division, and the third resolution was withdrawn. In the course of the debate the Government urged that it was inexpedient to make a change which would so deeply affect the interests of the poorer classes without much more investigation than had yet been given to it, and gave an assurance that the subject should receive the most careful consideration possible.

The next step taken was the issuing of the present Commission by Your Majesty, by which we are instructed to consider "how far it may be practicable " and advisable to introduce the principal of Deci- " mal division into the coinage of the United King- " dom."

Having thus traced the progress of the question of Decimal Coinage down to the issuing of this Commission, we had next to consider and define the precise subject referred to us by Your Majesty.

The questions of the decimalization of weights and measures and of international coinage were early forced on our notice. These are questions of great importance, and upon which probably much difference of opinion will exist. But they are not, we conceive, necessarily involved in the subject of our inquiry, and it appears to us that the terms of the Commission under which we act restrict our investigations to the practicability and expediency of introducing the Decimal principle into the coinage of this country, without contemplating any change in our present system of weights and measures, and without considering the possibility or advantage of an international system of coinage.

Under these circumstances, the weight of authority and evidence which we found had been already brought to bear in favour of the Pound and Mil Scheme by the recommendations of preceding Commissions, in the Evidence and Report of the Parliamentary Committee, and by the proceedings of the Decimal Association, led us to select our first witnesses from among the opponents of that scheme, and to postpone the examination of witnesses favourable to that scheme.

We accordingly proceeded to call before us, as witnesses, those persons who were understood, by their publications or otherwise, to be the most prominent and the best informed of the opponents of the recommendation of the Parliamentary Committee, and who were either supporters of the present system of coinage or advocates of the scheme known as the Penny Scheme.

The evidence of these witnesses will be found in the Appendix to this Report.

We likewise, at an early stage of our proceedings, applied ourselves to the preparation of a series of questions to be sent to foreign countries in which a Decimal Coinage had been introduced, with a view of obtaining information on several points, namely, the previous state of the coinage, the reasons which led to the introduction of the Decimal Coinage, the difficulties which had been found to attend the change, the extent to which the Decimal Coinage had been brought into practical use, and the result how far satisfactory or otherwise.

Copies of these questions were transmitted, on the 4th of March 1856, by our Chairman to Your Majesty's Secretary of State for Foreign Affairs, with a request that they might be sent to Your Majesty's Ministers or Consular Officers in the several countries to which they were applicable, and copies were also sent by different members of our Commission to personal friends, in those countries, who were known to be competent to give valuable information on the subject of the queries.

To these inquiries, and principally by means of Your Majesty's Ministers in the countries in question, and the courtesy of the Governments of those countries, numerous answers have been received, which will be found in the Appendix to our Report, and in some of the more important cases these answers have been accompanied by large and valuable collections of public documents relating to the changes in the coinage of those countries.

We also caused to be printed for the use of this Commission, and have included in the Appendix to the Report, several communications made to us in the course of this inquiry, various tables prepared for the Commission, and other documents, public and private,

which we have found to be useful in the prosecution of our inquiry, and which we think may tend to promote a thorough sifting of the subject, and thus lead to a correct understanding of the subject by the public.

A series of questions has been laid before us, prepared by one of our members, Lord Overstone, described by their author as being drawn up with a view of bringing under distinct notice and examination some of the advantages of the present system of coinage, and some of the principal difficulties and objections which have been suggested with respect to the introduction of a system of Decimal Coinage.

We do not consider that it would be expedient that the Commission should express, or that any grounds should be given to infer, any opinion on the subject of this paper, and therefore we feel it would be open to misconception if it were made part of our Appendix; but we have directed it to be printed as a separate document communicated to the Commission by its framer, and humbly submitted to Your Majesty.

Having arrived at this stage of the inquiry, and before proceeding to the other branches of the subject which still remain for investigation, it has appeared to us to be of importance for the satisfactory prosecution of this inquiry that we should make this Preliminary Report, for the purpose of submitting to Your Majesty the information which we have obtained as to the state of the coinage in foreign countries, and the evidence of the witnesses already examined before the Commission, together with the other documents to which we have referred.

By these means we hope that the attention of Parliament and of the public may be directed to many important considerations and difficulties connected with this subject, without a careful examination of which no safe and satisfactory judgment can be formed.

By these means, too, we hope that the witnesses who remain to be examined will be better prepared to assist us in discovering, weighing, and answering the arguments and objections for and against the present system, and the various schemes which have been proposed.

Some important branches of the question still remain for investigation, and there are also to be considered some points of detail connected with the means and the difficulties of a transition from the present system to the Pound and mil Scheme, or any of the other proposed schemes.

We therefore humbly submit this our First and Preliminary Report for Your Majesty's gracious consideration.

4th April 1857.

MONTEAGLE, Chairman. (L.S.)

OVERSTONE. (L.S.)

J. G. HUBBARD. (L.S.)

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